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Innovative Financing for the Environment

Project Report

(A)

*A Survey of Case Studies in Creative Funding
for Environment and Natural Resource Conservation,
Cleanup and Protection*

June 1997



Environment
Canada

Environnement
Canada

BBL-0467

Innovative Financing for the Environment

A Survey of Case Studies in Creative Funding for Environment and Natural Resource Conservation, Cleanup and Protection

June 1997

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A project for:



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Environnement
Canada

Great Lakes Corporate Affairs
Ontario Region
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Innovative Financing for the Environment

A Survey of Case Studies in Creative Funding for Environment and Natural Resource Conservation, Cleanup and Protection

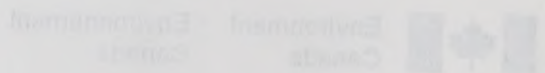
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A project for



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Summary

Generally, public support for government involvement in the environment remains strong, but fiscal reality now dictates that government cannot be the sole source of support for environmental management. An emerging challenge is finding creative ways of financing environmental policy. In some instances this will require a new approach to financial responsibility, and in others it will entail the development of new revenue sources. Environment Canada, Ontario Region, wants to assess the potential for developing a database of innovative funding approaches to conservation. The focus of such a database would be case studies — actual experiences where conservation, environmental protection and cleanup have been creatively financed.

This project report provides the results of a survey that collected case studies in innovative financing. As well as providing an outline of the study method, results and recommendations, the report provides a brief review of financing options. The review is not intended to be a definitive discussion of financing tools, but it does provide a basic introduction to common themes and mechanisms. The project report provides an indication of the diverse information that is available from different agencies and organizations. This is not a policy document. The report should be treated as a pilot study that may lead to further case study work in innovative financing for environmental management.

Most case studies were collected through an interactive Internet site. Respondents used an electronic survey form to provide details about their case study. The survey was advertised through an *Environment Canada Information Note* (release) sent to a broad range of organizations involved in environmental management (government agencies, multilateral and non government organizations in North America and overseas). Though an Internet site was the primary collection point for case studies, potential respondents were also given a post and email address where information could be sent.

Results

Thirty one responses were received, 25 through the Internet site and 6 by post. These responses yielded 46 useable case studies (4 were not used because the amount of information provided was insufficient). Some respondents provided reports or grant inventories which were reviewed for examples of innovative funding. Some respondents also suggested specific organizations or individuals that might provide

additional relevant information. These contacts yielded further examples and the high quality of this information suggests that approaching agencies directly for case study data is the most effective method of information collection.

The majority of the case studies received relate to water resources (24). Most case studies were received from the United States. Despite an extensive effort to solicit information from Canada, and the fact that the sponsor was Environment Canada, there were only 10 Canadian responses.

The perception of innovative financing can be quite variable across jurisdictions. Several themes tend to dominate especially cost sharing, joint public private initiatives, and user pay mechanisms. Often the development and implementation of creative funding is coupled with a product, or conservation approach, that is itself innovative.

The information received covers projects and programs that vary considerably in scale from a few thousand dollars to results measured in the millions. The emphasis ranges from capital investment designed to meet recurring costs over the long term to funding intended to support short term activities. The detail provided by respondents also varies. Some provided substantial information on the development, implementation and financing aspects of their project. In a few instances reports and grant reporting documents were also provided. Most respondents provided only brief descriptions.

Many of the case studies may be applicable to multiple sectors. The level of interest in developing innovative financing for environmental work is quite high. Informal discussions with people in government and the academic community indicate that there is considerable interest in developing more examples of creative financing, and there is also interest in learning about the experiences of other jurisdictions. Though this pilot study has yielded a relatively modest number of examples, discussions with a range personnel in conservation agencies and reporting literature suggests that there is substantial information available. The challenge is obtaining access to such information.

It is concluded that using an Internet site is of limited utility in collecting detailed information about innovation in conservation financing. The extent of Internet accessibility is, in all likelihood, not extensive enough to be useful for such research. An approach that combines direct contact with a range of agencies and organizations, and a content review of journals, government, NGO, and multilateral organization's documents would be a more productive method of collecting case studies.

Key recommendations

The development of a database of case studies in innovative financing would provide useful information for public government agencies and non government organizations. In North America and overseas there is significant interest in creative funding for environmental work. But there are few, if any, comprehensive databases that cover a range of sectors. The collection of this type of information would benefit Environment Canada by providing potential templates and information for the creation of program initiatives within Canada. A broader altruistic function would also be served by providing data that would contribute to the advancement of good conservation policy in any jurisdiction. The Government of Canada has developed a range of policy objectives in water resources, air quality, biodiversity conservation, multilateral commitments, and public information and participation in environmental management. Providing an inventory of examples of creative funding would help support work in all of these areas.

Further work?

If a larger case study project is supported then the research should be based on direct communication with relevant organizations in North America and overseas. Multilateral contact should be limited to international organizations in order to reduce cost and contact time. The experience gained from this study suggests that multilateral agencies often have an excellent understanding of financing innovative policy across a range of jurisdictions.

The experience of this study indicates that direct contact with agencies and other organizations will yield the best results. Considerable attention should be paid to methods that maximize the number of responses. Secondary data reviews would concentrate on the trade and academic journals, and government and NGO documents that are important case study sources.

Acknowledgments

The contributions all respondents are greatly appreciated. Many of those who submitted information provided detailed and extensive accounts of their experience with creative financing. Some agencies provided substantial assistance. In particular Environment Canada, the Maryland Department of Natural Resources, the U.S. Environmental Protection Agency, and the World Bank provided substantial background papers, project reports, grant inventories, and accounts of current activities. These contributions yielded a range of diverse case studies. Throughout the development of the report Environment Canada personnel have provided welcome comments and suggestions.

Acronyms

BMP	Best management practice
CI	Conservation International
FRP	Forest renewal plan (program)
GEF	Global environment facility
GLIMR	Great Lakes information management resources
GRTS	Grants reporting tracking system (USEPA)
MDNR	Maryland Department of Natural Resources
NGO	Non government organization
NPS	Non point source pollution
OECD	Organization for Economic Cooperation and Development
OMOE	Ontario Ministry of Environment
RAMSAR	Convention on Wetlands of International Importance, Especially as Waterfowl Habitat
SRF	State revolving fund
TMDL	Total daily maximum loading
UNCED	United Nations Commission for Environment and Development
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNIDO	United Nations Industrial Organization
USACE	U.S. Army Corps of Engineers
USAID	U.S. Agency for International Development
USBLM	U.S. Bureau of Land Management
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
WWF	World Wildlife Fund



1 Introduction and objectives

A. Innovative financing for the environment

Around the world many conservation and environmental protection agencies are facing budget reductions. As fiscal resources decline some public and private organizations have been developing innovative approaches to financing conservation work. Environment Canada, Ontario Region, wants to assess the potential for developing a database of innovative funding approaches to conservation. The focus of such a database would be case studies — actual experiences where conservation, environmental protection and cleanup had been creatively financed.

Public conservation and protection policy in North America and Europe has relied primarily on government fiscal support. In the developing world, where financial resources have been limited, partnerships between governments, international organizations and non government groups have been a common part of implementing conservation objectives. Generally, public support for government involvement in the environment remains strong, but fiscal reality now dictates that government programs cannot be the sole source of support for environmental management. An emerging challenge is finding creative ways of financing environmental policy. In some instances this will require a new approach to financial responsibility, and in others it will entail the development of new revenue sources.

What is in the project report?

The project report provides the results of a survey that collected case studies in innovative financing. This report begins with an introduction to the topic including a brief statement of objectives. An outline of the study method, the main results of the survey, and recommendations for further work follows the introduction. In the second section a review of financing options is provided. The review is not intended to be a definitive discussion of financing tools, but it does provide a basic introduction to common themes and mechanisms that could form part of the introduction to an eventual database. Readers who are interested in theoretical issues

or detailed discussions of specific models may wish to consult the references noted. The case studies received from the survey are detailed in the third section.

Appendix A details the survey method and present a critique of the approach. Appendix B shows the survey questions and *web site* layout. The project report provides an indication of the diverse information that is available from different agencies and organizations. It is not intended to be a policy document. The report should be treated as a pilot study that may lead to further case study work in innovative financing for environmental management.

Objectives

The main objectives of this project were to collect case studies of innovative financing for environmental conservation, protection, and clean up, and to assess the potential for providing an Internet based database of case studies. The terms innovative and creative are used in the broadest sense, and may refer to any case study that does not rely solely on a single source of government financing. The types of activities that might be supported range from large scale capital intensive projects such as storm water management or sewage treatment to small scale projects such as habitat restoration, conservation education programs, or public participation. Innovative tools might include options such as emissions trading, funding partnerships, privatization of environmental services, user fees, or revolving funds.

What constitutes creative or innovative financing?

Innovation and creativity in financing conservation efforts refers to any effort that does not rely solely on traditional government support. Though in some instances government may provide seed money for innovative efforts that become self sufficient. Partnerships between public and non-public sectors, revenue generating tools not previously used for a specific problem or a particular jurisdiction, even privatizing services, essentially any financing approach that is new to the organization or jurisdiction.

A problem in the conservation financing literature is that concepts are well discussed, but there are few examples of the ideas at work. The case study approach represented here may help public agencies and private organizations by providing illustrations of creative financing at work. The information collected is based on actual experiences and working examples.

The term conservation is used because it suggests a broad range of activities, it is also a common term in the lexicon of resource and environmental management agencies. Conservation in most contexts now includes environmental clean up and protection efforts.

Environment Canada and its consultant do not endorse specific case studies. The information described in this report may be made available to government agencies, non government organizations, business, and other interests through an Internet site in order to provide working examples of creative financing. Some of the case studies can act as templates for new initiatives. Further work may be initiated after the pilot study is reviewed. The report provides an opportunity to learn about new approaches to providing support, and dealing with declining funding for conservation work.

Because an Internet site was used to collect information the report also provides a brief evaluation of the potential for using an electronic forum as a mechanism for questionnaire research, and as a venue for making the results of government sponsored reports available to the public. These issues are discussed in detail in Appendix A.

How is conservation defined?

Conservation originally implied wise use of resources, not preservation. The term is now more broadly interpreted and is sometimes confused with preservation. As a working definition "conservation" is used in this report to describe any approach that supports the sustainable management of environmental resources. Case studies of environmentally sound development, environmental protection, cleanup, remediation, planning and policy development, support for public involvement, or capital projects are all considered to be examples of conservation, as long as they are employed to support environment or natural resource management.

Environment Canada has a particular interest in developing ideas and options for supporting its work in the Great Lakes basin. Since 1978 significant conservation efforts have been undertaken in response to *Canada/United States Great Lakes Water Quality Agreement*. A recent decline in provincial funding for related programs, and declining resources at the federal level have encouraged the agency to look at new and innovative ways of funding conservation efforts. This project is, in part, a response to these fiscal realities.

B. Method

Most case studies were collected through an interactive Internet site. Respondents used an electronic survey form to provide details about their case study. The survey was advertised through an *Environment Canada Information Note* (release) sent to a broad range of organizations involved in environmental management. Approximately 700 Notes were sent by post and email to agencies, and multilateral and non government organizations in North America and overseas. Though an Internet site was the primary collection point for case studies, potential respondents were also given a post and email address where information could be sent.

The Internet survey approach was selected for three reasons. First, it was anticipated that the cost would be lower than conducting a large scale survey by post or telephone, or an extensive data review of journals or trade publications, or government documents. Second, the Internet site might be less time consuming than other survey methods in terms of collecting and editing the results. And third, the agency wanted to gauge the potential for using an Internet site for future surveys, or for soliciting other forms of data.

C. Results

Thirty one responses were received, 25 through the Internet site and 6 by post. These responses yielded 46 useable case studies (4 case studies were not used because the insufficient information was provided). This is a small response rate when compared to most mail or telephone surveys. Some respondents provided reports or grant inventories which were reviewed for examples of innovative funding. In other instances the project consultant was told by email or through the Internet site about individuals and organizations that were involved in encouraging or developing creative funding. In these cases the consultant followed up by contacting the organization or individual to find out if any case studies or other relevant information could be obtained. Such contacts yielded additional examples and the high quality of this information suggests that approaching agencies directly for case study data is the most effective method of information collection.

The majority of the case studies received relate to water resources (24). Most case studies were received from the United States. Despite an extensive effort to solicit information from Canada, and the fact that the sponsor was Environment Canada, there were only 10 Canadian responses.

The perception of innovative financing can be quite variable across jurisdictions. Several themes tend to dominate especially cost sharing, joint public private initiatives, and user pay mechanisms. Often the development and implementation of creative funding is coupled with a product, or conservation approach, that is itself innovative.

The information received covers projects and programs that vary considerably in scale and funding needs from a few thousand dollars to results measured in the millions. The emphasis ranges from capital investment designed to meet recurring costs over the long term, for example Global Environment Facility supported trust funds, to funding intended to support short term activities. The detail provided by respondents also varies. Some provided substantial information on the development, implementation and financing aspects of their project. In a few instances reports and grant reporting documents were also provided. Most respondents provided only brief descriptions. Agencies that were solicited for additional information provided substantial documentation that was reviewed for applicable examples and these were included in abbreviated form.

Many of the case studies may be applicable to multiple sectors. The level of interest in developing innovative financing for environmental work is quite high. Informal discussions with people in government and the academic community indicate that there is considerable interest in developing more examples of creative financing, and there is also interest in learning about the experiences of other jurisdictions. Though this pilot study has yielded a relatively modest number of examples, discussions with a range personnel in conservation agencies and reporting literature suggests that there is substantial information available. The challenge is obtaining access to such information.

One problem encountered is that few agencies prepare comprehensive inventories of their projects. The reporting of financing and results for projects and programs is often relegated to internal accounts that may not easily be readily available to researchers. The same funding problems that have led agencies to look for creative ways of supporting their objectives are also reflected in a lack of personnel available for information collection and collation. Most agencies do not have the time or resources to provide the comprehensive reporting that would make finding case studies easier. Nevertheless, in this project direct contact yielded some of the most detailed information despite the reporting problems that some agencies face.

It is concluded that using of an Internet site is of limited utility in collecting detailed information about innovation in conservation financing. The extent of Internet accessibility is, in all likelihood, not extensive enough to be useful for such research. An approach that combines direct contact with a range of agencies and organizations,

and a content review of journals, government, NGO, and multilateral organization's documents would be a more productive method of collecting case studies.

D. Recommendations

The development of a database of case studies in innovative financing would provide useful information for government agencies and non government organizations. In North America, and overseas there is significant interest in creative funding for environmental work. But there are few, if any, comprehensive databases that cover a range of sectors. The collection of this type of information would benefit Environment Canada by providing potential templates and information for the creation of program initiatives within Canada. A broader altruistic function would also be served by providing data that would contribute to the advancement of good conservation policy in any jurisdiction. The Government of Canada has developed a range of policy objectives in water resources, air quality, biodiversity conservation, multilateral commitments, and public information and participation in environmental management. Providing an inventory of examples of creative funding would help support work in all of these areas.

A different approach to further work

If a larger case study project is supported then the research should be based on direct communication with relevant organizations in North America and overseas. Multilateral contact should be limited to international organizations in order to reduce cost and contact time. The experience gained from this study suggests that multilateral agencies often have an excellent understanding of financing innovative policy across a range of jurisdictions.

The method of collecting case studies should be based on a combination of conversational interviews, structured post or telephone surveys, and secondary data reviews. Ideally, conversational interviews are not structured around a set of predetermined questions, but instead employ a malleable interview guide centered on a few questions or themes. The informal interview approach allows participants to more readily introduce ancillary topics that might be excluded in more structured interview survey format. More structured survey approaches (predetermined questions) that typically include a combination of open ended and limited option questions can also be employed. The experience of this study indicates that direct contact with agencies and other organizations will yield the best results. Considerable attention should be paid to methods that maximize the number of responses. Secondary data reviews would concentrate on the trade and academic journals, and government and NGO documents that are important case study sources.

Environment Canada, in partnership with other agencies and non government organizations, might also find that workshops on innovation and financing could be beneficial. The definition of innovative financing should also be more discriminating. A more traditional, and systematic, approach to data collection would provide greater control over the quality of responses, and allow a project consultant more time to provide information about the study's objectives to potential respondents.

Should the Internet be used again?

The Internet is useful as a mechanism for disseminating information, but it is of limited utility as a survey tool. The method is not appropriate for making assumptions about a population.

It is recommended that the case studies presented in this project report, and the introduction to funding options be structured as a "sample database" and posted through the GLIMR *web site*. Input and support from other agencies that may be interested in assisting with a larger scale database project should be developed and incorporated into a large project. A *web site* survey would be useful to augment other more substantial methods of data collection, but it should not be the primary method of data collection.

2 Financing options

A. Options

This section provides an overview of common options for funding conservation, environmental protection, and cleanup. The discussion is introductory and provides a basic treatment of the subject area. It is not intended to be exhaustive, nor is it intended to be the focus of the report. The discussion contributes context. A selection of options for financing conservation, protection and clean up are briefly introduced, and a short elaboration on economic and non economic instruments is provided. The discussion presented here may also form part of the introduction to a case study database.

Most governments tend to rely on regulation to achieve environmental objectives. The dominant command and control approach seeks to regulate behavior through mechanisms such as emissions standards, withdrawal quotas, or even requirements governing the type of technology used. The success of regulation is well debated in the environmental management literature. The overall efficacy of the regulation approach is variable depending on the specific problems and the political or geographical context. For some issues, regulation may be the most practical and effective option for controlling human impact on the environment. The commonly advanced alternative to *only regulation* is including some form of economic instrument. These tools are also examples of innovative financing because in some instances they raise revenue, and in others they reduce costs thereby making scarce public resources available for other activities.

What constitutes innovation in financing is a variable across jurisdictions. The political, economic, and social context determines the preferred or traditional approaches to funding environmental activities. In North America and Europe the state has had an important role in conservation. But this too is variable. The way that the governments tax, the role of business and individuals, even the perception of property rights and ownership of natural resources is diverse. In the developing world the range of problems and issues can be even more divergent. Innovation in this context is subjective, and not always shared. What is common or accepted in some jurisdictions may be considered creative and new to others.

Economic Instruments

By integrating economic and environmental decision making economic instruments work within the marketplace to make environmentally positive decisions more attractive¹. Such incentives can accomplish conservation objectives at lower costs than traditional approaches². Economic theory suggests that if environmental damage is brought into the market place and a value is assigned to negative activities, then it is possible to establish a charge equal to the value of the impact. This discourages unsustainable behavior. But the concept is difficult to put into operation and assigning a value for environmental degradation is in itself a contentious issue.

Economic instruments, or incentives, have a number of potential advantages. Generally, incentives discourage negative activities and increase revenue for environmental agencies. But the most important advantage may be cost effectiveness. This can be achieved by the flexibility of market approaches; they are able to take into account the simple reality that the cost of controlling pollution is variable across its sources.

Economic instruments may also provide greater incentive for a firm to make improvements beyond those required; and not to simply try to meet a minimum regulatory requirement. Because they can be more cost effective than regulation results may occur faster under with incentives. For a given amount of money it may be desirable to go further beyond the regulatory minimum, and there may be greater support from industry for adopting more exacting environmental standards if economic instruments are available. Multiple objectives can also be more readily served. For example, in instances where a variety of emissions are produced tradeable permits could be employed to encourage a combination of pollution reduction and energy efficiency as firms strive to meet an aggregate objective rather than just the required loading for individual pollutants.

¹ This brief introduction to economic instruments is based on selected sections from two sources; Government of Canada, 1992, *Economic instruments for environmental protection, discussion paper*, Supply and Services Canada, Ottawa. and Hanna, K.S., 1996 *Alternative Options for funding Remedial Action Plan activities, a program pursuant to the Canada/U.S. Great Lakes Water Quality Agreement*, Environment Canada, Restoration Programs Division, Toronto.

² Bowles, I., Clark, D., Downes, D., and M. Guerin-McManus, 1996, *Encouraging private sector support for biodiversity conservation, the use of economic incentives and legal tools*, Conservation International, Policy Paper, Vol 1. Washington.

Economic incentives may also result in lower administrative costs to both industry and government. Regulators would require less information about abatement technology options since much of this information already resides with manufacturers. There may also be little need for lengthy certification of production processes, resulting in lower costs to business. Economic incentives may also make it easier for new firms to enter into an industry. Tradeable permits, for example, can have the advantage of assisting entry without resulting in an increase in emissions. The tradeoffs between emissions targets and growth that are inherent in a regulatory approach can be avoided — a firm would enter into a sector, within an economic incentive context, provided that it can acquire the required permit.

Categories in Brief

Economic incentives fall into two primary categories, tax instruments and non tax instruments. **Tax instruments** include environmental charges, incentives, and combinations of charges and incentives. Environmental charges are usually designed to change behavior by placing a charge on activities that impact the environment. Charges can be applied in several ways; in conjunction with regulations by applying a charge to emissions over a certain level, application to the total amount of discharge, or to actual amounts of a specific effluent. Or, instead of applying charges to emissions, they can be applied to inputs or products. Tax incentives modify behavior by rewarding environmentally positive activities. They can include preferential income tax treatment for particular producers, exemptions and deductions, or tax benefits to investors in specific projects and activities. In combining incentives and charges the two approaches work together by providing a charge on an activity, such as emissions, while providing a rebate or tax credit for introducing new technology. Behavior can be modified while allowing policy makers some flexibility to develop ways of offsetting any inequities or costs that may be associated with charges.

Non tax instruments include options such as emissions trading, user charges, deposit refunds, and compliance bonds. Emissions trading usually imply a ceiling on discharges of specific pollutants while shares in emissions are given to the producers which entitle the holder to emit a limited amount for a defined period of time. The permits are tradeable. Deposit refund programs are applied to instances where products can be recycled or reused. A surcharge is applied and refunded when the product or packaging is returned to a collection system. The effect, ideally, is to affect the recovery and reuse or recycling of selected products. Compliance bonds are an option where activities that have environmental impacts are subject to regulation. Such bonds are easily applied to resource extraction activities such as logging and mining and help insure compliance with reforestation or reclamation requirements.

Incentives are often discussed in the context of production activities, with an emphasis on particular emissions or byproducts. The conservation of land use can also be aided by economic approaches. The conservation of habitat can benefit from donations, easements, conservation agreements, and exchanges of land or even debt. The specific tax instruments related to land use conservation often comprise tax deductions or credits for contributions relating to conservation, tax deductions for specific uses, and tax exemptions. Encouraging land use conservation by means other than regulation entails a number of legal and tax issues which can be relatively complex, depending on the jurisdiction. All such options require some attention to financing issues, and the way that funding is approached can often be innovative.

There are also options for supporting conservation that do not address financing directly. Some policies act as perverse incentives by encouraging unsustainable activity. Such policies are designed to encourage economic activity but impacts the environment. Perverse incentives often impose environmental costs onto public agencies, and by addressing policy contradictions public resources can be reallocated. Funding problems can also be partially addressed by reducing costs. If value for money audits can be applied, greater efficiencies sought, or services privatized, then savings may be realized. The resulting savings may be reallocated to support other programs. Program and policy audits may also be developed to insure that there are no contradictions or overlaps in the actions and programs of different agencies.

B. Tax instruments

Creating new taxes or raising existing ones presents a range of implementation problems for conservation agencies. In most regimes there are few tax instruments that are administered by environmental agencies. In order to put such tools into practice the cooperation of other departments often has to be secured. Most of these revenue generating mechanisms would also require support from the political level, and in some instances the *general revenue trap* would have to be addressed. The latter point refers to the problem that some agencies have with respect to the monies they generate. In most fiscal systems the majority of funds collected by government are given over to general revenue, and then reallocated through the budget process. In instances where a conservation agency collects revenue for environmental work it would have to be certain that it could dedicate these funds to environmental projects either through the budget process or through special purpose accounts. In most jurisdictions government agencies presently collect taxes and fines, but it might be feasible to designate other conservation bodies to collect levies and then designate the funds for purposes prescribed by relevant agencies.

Regardless of the implementation problems associated with taxes, they have long been the traditional and preferred way of raising revenue for most governments. Within the context of conservation policy new taxes or similar revenue instruments present a range of feasibility and implementation issues. In many jurisdictions taxes, fees, special charges, user charges, and beneficiary charges are applied by all levels of government, and in some regimes the methods that might be most applicable to the conservation objectives are not administered by a national government. Cooperation and integration among multiple levels of government would be essential, and a method for allocating revenue directly to environmental work would have to be established.

In addition to feasibility the criteria for ease of implementation two primary criteria should be considered when considering the revenue generating mechanism discussed in this section. Economic efficiency dictates that the net benefits to society should be maximized when the funding mechanism is introduced. Equity, in the economic sense, would dictate that the charges, taxes, or fines, should directly reflect or be related to the costs that are imposed on society by the action. Both criteria are based on economic principles and can be measured to varying degrees depending on the instrument and the context. Both equity and efficiency are aspects of overall cost allocation principles. The three basic cost allocation principles that will apply to any evaluation of new taxes and fees are the polluter pay principle, user pay principle, and beneficiary pay principle.

The polluter pay principle is related directly to the deterioration of the environment and natural resources. Simply defined, it holds that "the polluter should bear the cost of measures to reduce pollution decided upon by public authorities to ensure that the environment is in an acceptable state"³. Efficiency is served because the cost of polluting is reflected in the taxes or charges applied, and the market can allocate these to consumers and producers alike. Ideally, there is a clear indication from the market of the cost of environmentally unsustainable activity. Equity is served because the cost is borne by the producers and consumers of the product or service causing the problem.

A user pay principle simply holds that the consumer of an environmental benefit bears the cost of consumption. Therefore society does not subsidize the recreation or resource using activities of others. Equity and efficiency is served by allocating costs to those who use the environmental resource. The costs imposed on the environment, such as remediation, restoration, maintenance and related services, are borne by those who use a specific service.

³ Opschoor, J.B. and H.B. Vos, 1989. *Economic instruments for environmental protection*, OECD, Paris.

The beneficiary pay principle allocates costs based on consumption of a benefit. Those who benefit from a resource pay for its maintenance, restoration or provision. The difficulty in this principle is the process of allocation. While user pay and polluter pay principles can be directly applied, the beneficiary pay principle is based on a theoretical willingness to pay for a resource⁴. Willingness to pay, ability to pay, and actually paying are also issues inherent in implementing a tax or fee based on a beneficiary pay principle. Identifying who benefits from a resource presents significant administrative and technical issues in implementation and feasibility; especially when the benefit is indirect or not explicitly sought by the recipient.

Some of the products that are provided through the work of conservation agencies can also be considered joint products. Joint products benefit not just the general public in a tangible or intrinsic way, but they also constitute a direct benefit to industry or special interest groups. Clean water, for example, benefits firms that need it for manufacturing. Water quality also affects recreation, the commercial fisheries, and other amenities which often have measurable benefits. The preservation of wilderness and habitat benefits hunting, fishing, and other recreational activities. Habitat and general environmental quality can be related to the desirability of a community as place to live or as a place to locate business. Governments provide many of these amenities through direct program activities, and indirectly through regulation or other incentives.

Other environmental services that are commonly seen as benefiting the public as a whole may really result from policies that support only a few interests. Forest fire fighting is a service that can be provided to protect human life and property, or to protect industrial timber supplies. There may be few ecological benefits of fighting forest fires; fire is an essential part of the natural process in many forest types and interrupting it may be contrary to good ecological management. When fire policy is dictated by the desire to protect economic forest resources then the cost may be borne by the industry or communities that benefit. In Canada, Ontario is presently instituting a system to have industry pay the cost of fighting forest fires. In the instance of joint products it may be appropriate that the primary beneficiaries contribute more than the rest of society. Some environmental services lend themselves to cost recovery for the provision of joint products.

⁴ Ontario Ministry of the Environment, 1992. *Potential funding mechanisms for implementation of Remedial Action Plans and their impacts on users beneficiaries, polluters, and society*, OMOE, Toronto.

Taxes in general

Taxes cover a broad range of instruments applicable to the general public. These can include direct taxes such as property taxes (both *ad valorem* and tangible), taxes on business receipts, business income taxes, personal income tax, and death or gift taxes. Indirect taxes are applied to transactions and expenditures. The value added taxes common in Europe and Canada are applied to virtually all goods and services at most stages of production and to retail sales. Sales taxes, applied to goods sold at the retail level, are common in many regimes. The semantics of taxation overlap and the distinction between some labels can be subtle. Most national governments use many of these methods.

In special instances a special surcharge or surtax could be added to support environmental programs, or a portion of existing receipts could be dedicated to conservation work. These charges can be applied selectively only to residents, transactions, or goods within a defined area. A relatively small increase of 0.05% to a large increase of 1.0% in existing taxes, or the addition of a similarly small new tax, may have the potential for generating substantial resources for environmental programs. However, these options, indeed most tax options, have to contend with issues of political and administrative feasibility. The recent North American experience is simply that there is little public or political support for tax increases or new taxes. But there may support for carefully targeted taxes that are applied directly to activities or entities that have a direct impact on the environment.

Surtaxes and surcharges

A surtax, or conservation tax, implies a dedicated increase that is applied to an existing tax, fee, permit, or licence. The additional revenue is ideally allocated directly to predetermined program activities. Governments at all levels administer common agents such as commercial fishing and hunting licences, research permits for animal and flora collection, parks fees, resource royalties, discharge permits, and even highway tolls. Such permits and fees might well lend themselves to a surtax to support specific conservation or restoration programs.

Surtaxes or surtaxes may realize significant revenues. Surtaxes are also applicable to income tax. There are examples where healthcare and the application of a minimum required tax are implemented through relatively small surtaxes (Canada and Ontario for example). British Columbia's Forest Renewal Program is supported by a surtax on resource royalties, the surtax raises about CDN\$400 million per annum for forest management programs (see Case Study B9).

Special sales and service taxes

This category refers to new taxes that may apply to the general public as a whole but are added to specific products and services. They are selective and are directly applied to goods and services that relate to a well defined environmental problem, region, or in support of a specific program. For example, new taxes can be added to fees for hotels, campgrounds, and other accommodation, automobile and recreation fuel, garbage and other disposal services, and products such as pesticides and fertilizers.

Implementing such options often requires integration of efforts among different levels of government, and in some contexts local government might have a significant role. Issues such as the geographical extent of such taxes can also be important. But the potential benefits for conservation funding could be significant. In each instance the additional tax would be dedicated to environmental work, and publicizing this purpose might make the addition of the tax more palatable to the public and decision makers. The public may accept small increases in consumption taxes if the proceeds are dedicated to environmental work, and dedication is consistent and well stated.

Transaction and other unique charges

Transaction charges do not apply to the general population but are applied to exchanges that directly affect the environmental quality. Charges can be applied to severances, or on adjacent lands that directly; and to the production materials used to manufacture chemicals, plastics, and wastes. Transaction charges may also be levied on the transport and disposal of wastes associated with environmental degradation. Complimentary waste taxes can also be applied to storage, volume of production, and level of toxicity of wastes. Another range of transactions that are amenable to such charges are development permits and inspection fees. Though such charges are often associated with local or regional government they can be applied on almost any level to land use activities that may affect the environment or negate efforts to address specific protection or cleanup efforts.

C. Non tax instruments

User fees and beneficiary fees

User fees, or user charges, are applied to those who use a specific resource or environmental service. Beneficiary fees have the advantage of being selective and relatively precise. The potential application of user fees is broad and can be applied

to recreation such as parks, water, wildlife, or fisheries, or it can be industrial, agricultural or urban such as the withdrawal of water, sewage or storm water treatment, solid or liquid waste disposal, or even infrastructure use. User fees imply a structure that is designed to capture the full cost of service delivery. They help bridge the information gap between information and price signal by showing consumers that there is a monetary cost associated with specific actions. Ideally, user fees provide an incentive for the sustainable use of resources, and can also act to improve revenue collection for the provision of environmental services, or remediation and clean up.

User fees apply directly to those who access a specific service, and beneficiary fees apply to those who directly or indirectly benefit from an initiative. For example, a beneficiary fee could be applied to fishing licences within a jurisdiction to support fish stocking or habitat programs, because all licence holders potentially benefit from such programs. Or a beneficiary fee can be applied to fishing in a specific lake or bay where a restocking program has been initiated, or shoreline cleanup has been initiated. In the instances of fees for special areas a licence can be sold that entitles the holder to fish or hunt within a defined area. These would be in addition to existing permit requirements. In some areas additional permits are required for specific fish, such as *steelhead* in British Columbia, and most jurisdictions in North America differentiate among animals when allocating hunting licences. The proceeds from a location specific licence can be dedicated to conservation efforts within that area.

User fees now apply to many services provided by government. Most governments in North America and Europe are gradually introducing and increasing such charges to recover the costs of services they provide, and to generate additional revenue. In most locales fees are applied at national parks, and many governments are implementing or considering cost recovery methods that are in essence user fees. In North America these are being increasingly extended to the use of selected services, facilities, inspections, licences, and legal services such as property title transfer, many of which have been paid for entirely, or subsidized, from general taxes.

New fees can be applied to services such as an initial sewerage connection; inspection and monitoring for enforcement of regulations for water, air or land quality; ongoing use of services such as sewer, stormwater access, or drinking water; disposal fees at waste management or landfill sites; water discharge fees for emissions directly to lakes or streams based on volume, type of substance, or toxicity, or all of these; and recreation access fees at facilities where charges do not presently apply. Special fees can be levied on those who directly benefit from conservation efforts. Recreation users are an obvious category for beneficiary and user pay fees, but this can also include landowners who might benefit from increased

property values due to adjacent land trusts, or owners of shoreline property who would benefit from publically funded clean up and restoration work (see Case Study A14). Measuring benefits in this context requires careful evaluation, but it can be done by examining factors such as changes in property value, or improved recreational opportunities or increases in business that result from the work of specific program. Most levels of government administer services where such user or beneficiary fees can be applied with the resulting revenue dedicated to conservation efforts.

Fines

Fines are routinely levied for the violation of regulations governing emissions, or for other environmental impacts. In instances where fines are not presently applied they can be introduced. Existing fines can be increased and the revenue allocated to conservation efforts. A review of legislation in any jurisdiction would usually identify specific regulations and provisions where new fines can be applied or existing fines might be increased to support environmental work. In most systems this would ultimately require political and administrative support from senior levels of government. The implementation of revenue recovery and allocation may also present substantial integration problems among responsible implementing and enforcement agencies. The revenues generated, or the direct environmental benefits for conservation, would have to be sufficient to justify expanding this method.

Applying fines as a revenue generating tool may also be contrary to the existing (acknowledged) aims of such public policy instruments. Fines are generally applied to deter individuals or firms from engaging in destructive practices, rather than as a way for governments to raise money. At least that is the way they are most often presented, depending on the jurisdiction. Depending on the jurisdiction, fines for environmental infractions might be dedicated to conservation efforts by the courts.

Charges and fees not collected by government

The options briefly outlined in this section have addressed methods that would be applied by government. Non government organizations that work in support of conservation efforts may develop opportunities for raising funds through user fees or beneficiary fees, some of these can be applied with relative ease. In most European countries charges are routinely applied for visits to conservation areas and historic sites. Visitor fees support renovation and conservation work. The returns may be negligible, unless the site is of particular prominence and has a high number of visitors. But ancillary fees can be charged for parking, guide maps, guide pamphlets, and tours with all revenue going to maintain a site, or to support other programs within a given area. Parking charges are applied at National Trust sites in Britain,

and they are usually collected by machine. Natural and heritage conservation sites not owned or managed by government in virtually any location could apply some form of user fee. In some instances it may be feasible to collect such charges by machine (see Case Study B1).

In some regions, especially in North America, the subsidies that have been provided for conservation areas are being reduced or eliminated. Non profit organizations, or locally based public agencies, may assume a greater in management. Supporting local conservation efforts will increasingly rely on the participation and management by NGOs.

Deposit Refund

Deposit refund programs are applied to instances where products can be recycled or reused. A surcharge is applied and refunded when the product or packaging is returned to a collection system. The effect, ideally, is to encourage the recovery and reuse or recycling of selected products. The approach is also applicable to products that may have special disposal problems. In theory deposit refund programs encourage sustainable practices by reducing the use of resources.

Many jurisdictions in North America have applied deposit refund systems to beverage containers. Some industrial containers such as steel drums have long been subject to deposits. In some European countries the return options have been applied a range of packaging though the use of deposit refund systems is relatively undeveloped. This is a concept that can be broadly applied with direct links made to packaging, services and related environmental impacts.

Trading and transferrable permits

Transferrable, or tradeable, permits imply a ceiling on emissions for a specific pollutant. Shares in emissions are given to the producers which entitle the holder to emit a limited amount for a defined period of time. The permits are tradeable. Producers who manage to reduce emissions can sell their permits to those who cannot, or do not want to. But the permits have a specified time period and eventually all producers must meet certain criteria. The permits provide flexibility in achieving overall criteria without imposing potentially debilitating cost onto industry at once. This is a combined approach that uses both a regulatory and market incentive.

Air emissions have merged as probably the most prominent sector in which tradeable permits have been applied. Usually trading for air quality is conducted on macro regional or national basis, but there are examples of trading on a municipal level (Santiago, Chile) The U.S. Environmental Protection Agency has produced a

framework for watershed based trading in discharge permits (Case Study A22), and Environment Canada and partner agencies have initiated a program to develop a phosphorus trading program within the Great Lakes context.

Mitigation Banking

Mitigation banking provides compensation for habitat destruction caused by development or other human activities. It is usually achieved through the creation or enhancement of comparable habitat in another location. The objective is to provide compensation by providing habitat of equal or better ecological value (Case Study B13).

The concept of mitigation banks is simply that relatively large areas of comparable habitat whose estimable tangible and intangible value, called credits, are similar to cash deposits in a bank⁵. Compensation is made by withdrawing credits from the bank as development occurs. The withdrawals are ideally equivalent to the value of habitat lost. When credit is used up then further mitigation must be achieved by other means, such as restoration or protection, or through the development of a new bank. A complimentary approach is seen in no net loss policies that require the creation of comparable habitat as compensation for development. No-net-loss regulations do not require banking, but apply compensation requirements on an *ad hoc* basis. Mitigation banking and no net loss regulations may assume ratios for compensation in order to account for the differences in quality between lost and compensated habitat. The application of these can be critiqued as inadequate responses to unsustainable growth. Compensation may be a faint replacement for natural habitat.

Eliminating perverse incentives

Perverse incentives occur when governments provide support activities that are environmentally unsustainable. Such support can take the form of tax incentives, low royalties or rents for public resources, or direct subsidies for resource extraction. For example, below cost timber sales and other forestry subsidies, may cause faster resource depletion. Development subsidies that support urban or industrial growth may result in the loss of habitat or the emission of more pollutants. Programs that provide tax benefits for the conversion of forests or draining of wetlands in order to create agricultural land are not uncommon in many countries, including Canada. The

⁶ Reppert, R. 1992. *National Wetland Mitigation Banking Study, wetlands mitigation banking concepts*, IWR report 92-wmb-1, Institute for Water Resources, U.S. Army Corp of Engineers, Alexandria.

elimination of perverse incentives, especially subsidies and tax benefits could improve revenue and modify unsustainable behaviour.

For example, incentives in Canadian forest management have long been a point of contention not only with environmental groups, but also with Canada's trading partners. The issue of subsidized timber sales has dominated Canada's lumber tariff disputes with the United States. The issue is complex to say the least; the American contention has been that the price of timber from public lands in some provinces has been below market value. Some environmental groups have supported this argument. Partially as a result of the trade dispute timber prices have risen in recent years. Other subsidies, such as government funding for road building and reforestation, though many of these have been modified or eliminated in recent years. Similar programs also exist in the U.S. for public lands. Indeed the U.S. now provides more subsidies for public forest access than Canada. But such subsidies are not unique to North America. In Sweden the conversion of natural forests, euphemistically called *skrapskogar* (*garbage forests*), is funded by government, and private woodlot owners are encouraged by regulation and subsidies to apply industrial management to their lands. In Finland elaborate funding and technical support programs have been developed to encourage the draining of wetlands and boglands and their conversion to industrial forests. Though these measures have a short term economic benefit from the perspective of environmental sustainability they constitute a perverse incentive

Compliance bonds

Compliance bonds are best applied in conjunction with regulation. Such bonds are easily applied to resource extraction activities such as logging and mining. The bonds are posted to insure compliance with reforestation or reclamation, or other performance requirements. They might also be applied to shipping oil in domestic waters, transporting toxic products and wastes, or even for habitat restoration or rehabilitation required after construction, mining or logging.

Many environmental and natural resource activities are subject to regulation. A compliance bond can be posted to insure that the activity does not result in environmental damage, or to guarantee that the cost of remediation and restoration will be covered if such works are not carried out by the permit holder. The compliance bond ideally acts as a financial guarantee of good environmental practice. This type of bond is simply a set amount of money that is deposited with a private trustee or government agency. The amount usually reflects the potential cost of damage or restoration. Once the activity is completed the value of the bond plus interest is returned as long as the performance criteria of the permit have been met. If it has not, then the bond may be used to cover the cost of remediation. Compliance

bonds can be structured either as a bond provided by a bonding firm, or as a sum invested with a trustee or government agency. In instances where a firm receives payment for construction or remediation, a hold back can be applied until the quality of the work is assessed. Retaining the interest from a compliance bond would also be an option for supporting environmental work. Forfeiting the interest could be a form of tax or user fee.

Compliance bonds are common in the U.S. and Canadian mining industries. They are also commonly used in forestry to insure that forest road building, silviculture, or other required works meet established criteria (British Columbia, for example, requires that bonds be posted for silviculture and forest road construction). In managing fisheries, such bonds can be required when works are carried out in areas where fish habitat may be impacted.

Privatization

The privatization of government services and holdings has been advanced in some jurisdictions as a method of reducing costs. In Britain and France some water services have been privatized. In the U.S. there are examples of wastewater treatment and mitigation banking being provided by private sources. In Canada services such as highways maintenance, parks operations and maintenance, and park interpretation are now contracted to private firms (British Columbia).

The primary issues associated with privatizing public services relate to the maintenance of quality and standards, employment creation, cost to the consumer, and ideological opposition to private sector involvement in areas traditionally viewed as being the responsibility of government. The first two issues can be addressed through regulation or the terms of the contract. The third issue may require regulation of pricing and profits, or subsidies to insure that the consumer does not bear unreasonable costs. Inspection and enforcement become important aspects of maintaining quality and standards. The last issue is not always addressed easily, but education, pricing control, and the maintenance of standards can help mitigate opposition.

The pricing of privatized services is potentially complex. In some instances high prices may be desirable to encourage conservation or convey the true cost of using resources. Government may still subsidize some privatized services. Other services (highway maintenance for example) rarely allow the direct application of costs to the consumer, though tolls can be employed. Contracting selected environmental services to the private sector would often result in savings to government.

Integration and cost sharing

Several of the case studies received in the survey highlight the increasing importance of cost sharing and the integration of efforts among agencies (see Section 3A). Integration has emerged in many jurisdictions as way of increasing efficiency and reducing costs. By coordinating efforts, or implementing cooperative decision making process, governments have been able to share limited funds among agencies that manage overlapping or diverse aspects of common natural resources.

Integration and cost sharing require a cooperative approach which is not always easily achieved; especially when there is competition for diminishing financial resources. Conflict over authority, budget allocation, and responsibilities can be significant impediments to the implementation of integrated efforts. Often, the most successful integrated resource management models are those that encourage and facilitate costs sharing and cooperative decision making but do not require agencies to transfer authority. There is considerable potential for the realization of savings and new efficiencies when agencies develop formal cooperation arrangements to achieve common program objectives.

D. Conservation trusts, easements, and land donations

The use of land trusts

This method of preservation has been widely developed in the United States and Great Britain, and is an emerging tool for biodiversity conservation in the developing world. In Britain the National Trust has emerged as one of the most important landowners in that nation. The National Trust manages and protects a vast array of historic properties, shorelines, farmland, and countryside. There are few comparable domestic trusts anywhere, though the Nature Conservancy, Conservation International, and the American Farmland Trust have become significant organizations that now own, manage, or facilitate the preservation of relatively large areas of wilderness and countryside.

Land trusts can benefit conservation in four basic ways; first, they can protect wetlands, shoreline, woodlands, watersheds, or other habitat of various size without the expenditure of significant public funds; second, trusts can play an education and participation role by enhancing public knowledge and support for overall environmental objectives; third, land trusts and related organizations provide an existing or potential focal point for organizing participation in rehabilitation and restoration work not only on trust lands but potentially on public lands too; and fourth, the development of land trusts have become an important tool in biodiversity

conservation. They may also serve as a point of focus for cooperation between different levels of government, non government conservation organizations, and business.

While local initiatives are important there are organizations that operate on a scale beyond a local or regional basis (such as the Nature Conservancy, Ducks Unlimited, World Wildlife Fund, or Conservation International). Such organizations offer some distinct advantages over those that are primarily community based. They can offer broad management expertise and experience, their resources are significantly larger than local organizations, and in some instances they may be designated as organizations that can receive *gifts in trust for government*. The latter point may provide a tax advantage for donations made to such groups, an advantage over donations made to non designated groups, though this will vary according to jurisdiction. Such considerations should not preclude the encouragement of locally based initiatives, and many small groups are capable of helping to implement environmental work.

In the developing world debt for nature exchanges have also emerged as important approaches to conservation. This approach is simple in concept, but can be difficult to apply. External debt is purchased and extinguished, by an NGO or multilateral agency, in exchange for the preservation natural areas or other environmental concessions. Land title may then be transferred to an NGO or designated trust. The applicability of this mechanism to the developed world has not been adequately explored. Debt from state, provincial, or local governments could be exchanged for the preservation of environmentally sensitive areas, additions to parks, or concessions in environmental management. Bonds, or other debt paper, could be made redeemable for lands significant to biodiversity conservation or other ecological objectives. Some governments in North America and Europe may be open to this approach.

In many regimes the framework exists for encouraging the expansion and development of trusts as an alternative to government ownership and direct management of ecologically sensitive lands, or lands deemed to be in need of rehabilitation, restoration or long term conservation work. The term land trust, as it is used refers primarily to an organization. There are three primary mechanisms that can be used to implement the basic conservation or preservation goal of a trust, conservation easements or covenants, and ownership.

Land ownership by trusts

Ownership can be accomplished by donation, purchase or exchange. In most jurisdictions ownership by a trust will confer tax exemptions or other benefits, but these issues can be complex, especially if income from property is realized or there

are capital gains received at the time of purchase or sale. Donations can be encouraged by tax benefits for gifts to public agencies or non profit organizations, this is common in many regimes. Purchasing environmentally sensitive land depends on the resources of the trust, many non government organizations do not have the funding to purchase significant lands. Exchange implies a trade of lands of equal value, environmentally desirable property is exchanged for land of equivalent market value elsewhere. This tool has been used in North America on the local level where parks and conservation areas have been created through exchanges with developers.

Conservation easements

A conservation easement is sometimes called a voluntary or restrictive covenant though the covenant implies a slightly different arrangement. The essential element of the easement concept is that the land remains in private ownership. The property owner accepts a covenant against development or other activities, but retains rights to other benefits. The restrictions ideally apply only to those actions that have some negative environmental impact. Voluntary easements have also been used to protect agricultural productivity. A variant of the easement is a conservation agreement where the landowner enters into an agreement to manage resources in a defined manner in return for compensation which may be a tax benefit or subsidy. This approach has been applied to forest management on small holdings in Canada and Europe.

Depending on the jurisdiction an easement has an indefinite life span and is binding on future owners. A covenant is applied at the time of purchase as a condition of ownership. These restrictions on property rights are accepted voluntarily and can either be compensated, by the trust or government, or it can be provided by the landowner without expectation of compensation. Compensation from government may include differential tax assessments.

E. The enabling climate

Implementation and feasibility

The objective of collecting case studies in innovative financing is to provide brief examples that might be considered for emulation in other jurisdictions. But the transferability of these examples is variable. Examples of innovative financing that have been successful in one jurisdiction may have more to do with the political, social, and economic context than the merit of the concept itself. Implementation and feasibility have to be taken into account when considering the success or potential application of any case study. Several enabling issues emerge from the examples described here.

Feasibility and ease of implementation are important considerations when the transferability of a case study from one jurisdiction to another is assessed. Feasibility covers a range of issues. The degree to which any one issue will affect a project's success will be variable depending on the activity and the context.

Technical feasibility refers to whether the policy or program objectives can achieve their physical goals. This can be expressed as outcomes such as improvements in habitat conservation and remediation or better water quality. Economic, or financial, criteria such as program costs, the benefits produced, or the fiscal and economic implications of the policy or program have to be considered. Political feasibility reflects the support for the program or policy from political decision makers, administrators, or other participants and stakeholders in a process. Administrative support will also be important for determining how possible implementation will be within the institutional context.

Implementation is also affected by the provision of resources and procedures for putting an initiative into place. This involves the responsible agency, or agencies, which interpret the policy goal and determine what resources are necessary and how they should be allocated in the implementation process. Additional factors that affect interpretation are the clarity of the policy goal, the ability of the implementing agency to put the policy into practice, and political support for the initiative. Managing the operational aspects of implementation includes budget issues, sharing costs among agencies and levels of government, deciding how services will be provided and by who, or allocating personnel time and related resources. Implementation is a dynamic process linked to other policy activities and as such there will usually be adjustments in organization and interpretation during application.

While the points outlined above provide a macro perspective of implementation, feasibility often emerges as the determining factor in success. In most cases the

practicality of an option will be the defining factor in implementing innovative financing. Some options cannot be reasonably put into practice without significant administrative commitment by entities other than environmental agencies. In other instances support from the political level might be crucial. For example, new taxes, or an increase in some existing taxes can be used to finance conservation initiatives. However, putting such schemes into place is usually beyond the jurisdiction of environmental agencies. These instruments would require the participation of organizations that may not be presently involved in environmental management. In North America public and political support for new taxes, or increases in existing taxes, is sparse. Tax instruments may be an option, but they can violate certain assumptions of feasibility and overall ease of implementation.

Building capacity

Globally, the dominant approach to implementation is administrative (top down). But a growing trend in environmental management has been the intent to integrate stakeholders into decision making processes and including NGOs in implementation and management. It has been increasingly argued in the resource management literature that sustainable management must provide a link between the traditional public agency methods of implementation and those affected. The integration of stakeholders into decision making supports effective capacity building. This is an important point when the feasibility of implementing a new funding arrangement is considered.

Many alternative methods to funding will require the participation and support of non-governmental organizations, community groups, industry, and other private sector interests. Some political and bureaucratic contexts may provide a flexible basis for the implementation of innovative funding mechanisms because they are integrative in nature and have incorporated a relatively strong stakeholder participation process. Others may not be as amenable. Restructuring would have to occur in order to develop, or enhance, the participation of those who have not been traditionally included in decision making. The success of alternative funding arrangements may often depend on building capacity -- involving of non government groups and improving the ability of stakeholders to participate and contribute to success.

Issues related to economic instruments

Inherent in all the options presented above is the risk of diminishing returns, or a tax disincentive. Higher fees, new fees, new taxes or tax increases all have the potential for reducing use of public facilities, and lowering revenue over the long-term. A careful evaluation of any option must be undertaken to insure that the proposal will

have the desired return without discouraging public use. Equity in terms of access must be considered. In this respect a simple question has to be addressed; will the charge or policy disadvantage lower income people? In many instances the answer may be no.

Usually, if individuals can cover the basic cost of using non essential environmental services (such as recreation) they will be able to pay a marginally higher fee (or a new fee) without any undue disadvantage. Equity in terms of access is usually not a significant concern in this context. This argument holds well for the developed world, but in other jurisdictions the imposition of even modest fees might reduce accessibility. In other instances a reduction in an activity may be a welcome result of higher charges. Higher user fees or polluter pay charges may result in lower emissions, improved water quality, or other ancillary environmental benefits. While a measure of willingness to pay provides an important bench mark for such decisions, it is not the same as ability to pay or actually paying. In some locales there can be significant support demonstrated for paying for clean water or waste services. But the ability of recipients to fund development might actually be quite low. People may also feel quite different about a proposal once they are actually presented with an assessment.

Unless the intent of a fee is to reduce the use of an environmental resource the charge should be structured so that use is not discouraged. The public should be clearly informed about why a charge is being applied and how the revenue will be used to help the environment. In most jurisdictions clean water, sewage services, and waste disposal, even recreation and air quality often have a demonstrated high level of willingness to pay. But there is a difference between willingness to pay and ability to pay. In some areas despite the desire to develop and support environmental services, income levels may not be adequate to support infrastructure costs, or long term operation and maintenance. Some of the case studies involve the introduction of user fees, surcharges, or new taxes. Building public support for these options, and insuring that they can be supported by income, will in many instances be an important part of successful implementation.

3 Case studies in innovative financing

The case studies are organized according to the sector they represent; water, land, air and energy. Each description is based on the information submitted to the survey. Each has been edited and in some instances additional information was sought from the individual or agency that provided the submission. All descriptions include a brief commentary on the innovative financing aspects represented by the case study. These were not submitted as part of the case study and appear in *italics*. Some comments about the applicability to other jurisdictions or the North American context have also been added by the project consultant.

While the source for each example is identified, where applicable references to working papers, reports or other publications are also provided. The addresses of agencies or institutions where additional information can be obtained is given. In some instances the names of individual contacts are also available, these people have indicated that they are willing to act as an information source. Most examples were submitted directly to the project consultant, though several were collected from contacts suggested by respondents.

The case studies are also summarized in table form which provides a guide by subject and title, location, issues, and funding method (pages 30 to 36).

Table 1 Water resource management

Case Study	Subject & Title	Location	Issues	Financing aspects
A1	Storm water management; ecological demonstration	Texas	urban storm water management	government partnerships
A2	Storm water utilities; community and regional approach	Pennsylvania	non point source agriculture, habitat	government partnerships
A3	Storm water utility; the benefits of an integrated approach	Kentucky	storm water	user fees, utility approach
A4	Providing storm water management through a utility: the importance of a complete watershed approach	Oregon	storm water, sediment control	user fees, utility approach
A5	Joint federal and state funding for reducing non point source pollution	New Hampshire Rhode Island Texas	rural non point source, agriculture, habitat	government partnerships
A6	Multiple non point source remediation	Pennsylvania	agriculture, habitat, non point sources	cost sharing, government partnerships
A7	Storm and surface water utility	Washington State	storm water	user fees, utility approach
A8	Restoration and protection of water resources	Ohio	rural non point sources	revolving fund, linked deposit program
A9	Improving water quality through land use practices	Wisconsin	rural non point sources	cost sharing, government partnerships, landowner contributions
A10	Improving water quality and energy consumption, reducing farm chemical use	Iowa	rural non point source, agriculture	private/government partnerships
A11	Water quality project support; implementing a revolving loan fund	Washington State, South Dakota, Delaware	rural non point source, agriculture	revolving loan funds

Table 1 continued

Case Study	Subject & Title	Location	Issues	Financing aspects
A12	Waste water treatment; private management and financing	Maryland	waste water treatment, sewage	privatization, loans, utilities
A13	Developer financing for wastewater treatment	Pennsylvania	sewage treatment	privatization user fees, surcharges, offsets, developer fees
A14	Clean water districts	Washington State	agricultural, habitat	user fees taxes, loans, government partnerships
A15	Drinking water supply protection project	Indiana	rural non point source, agriculture, sediment	private/government partnerships
A16	Watershed pollution monitoring project	North Carolina	rural non point source, agriculture, sediment control	government partnerships, evaluation and assessment process
A17	Urban resource partnership (also related to land issues)	Pennsylvania	resource efficiency, capacity building, education	private/government partnerships
A18	Partnership funding for a water conservation newsletter	Colorado	rural non point source, habitat	government partnerships, academic support
A19	Wetlands enhancement and education	Colorado	storm water, habitat	private/government partnerships
A20	Improving household water use	New York	consumption, demand management, resource efficiency	financial incentives, retrofitting, structural improvements
A21	Fish hatchery management; NGO participation	British Columbia	habitat, fish stock improvements, participation	private/government financing, public participation, volunteer support

Table 1 continued

Case Study	Subject & Title	Location	Issues	Financing aspects
A22	Watershed based trading	U.S.	Non point source, point source, sewage, agriculture	permit trading
A23	Water rights exchange	California	Agriculture, municipal, point and non point source control, reallocation	water rights exchange
A24	Water auctions	Victoria State, Australia	Agriculture, reallocation, resource efficiency	resource auctions, equity in distribution, allocation to high value use

Table 2 Land use conservation, forestry, parks, wildlife

Case Study	Subject & Title	Location	Issues	Financing aspects
B1	Improving national parks revenue; enhanced user fee collection	Western Canada, National Parks	parks management, revenue collection, revenue retention	automated collection, user fees
B2	Wildlife conservation; Georgia's state license plate program	Georgia	non game wildlife	user fees, taxes
B3	Conservation research; Volunteer support and participation	Variable	variable, mostly land based conservation	volunteers, paying for participation in research
B4	Waterfowl, hunting, and habitat stamps	U.S.	wildlife, recreation, habitat	user fees, affinity support
B5	Mine reclamation and land treatment; using municipal sewage (also related to water resources)	Nevada	soil enhancement, mine site remediation, sewage treatment disposal	innovative and integrated sewage disposal, land use reclamation using organic waste
B6	Rehabilitation of pits and quarries	Ontario	Mining, quarries	surcharge, trust development, private/government partnerships, privatization of rehabilitation funds
B7	Financing environmental trusts; support from a state lottery	Nebraska	landfill, wildlife habitat, recycling, forestry, air and water quality, sediment remediation, land conservation	State lottery

Table 2 continued

Case Study	Subject & Title	Location	Issues	Financing aspects
B8	Soil enhancement project	Saskatchewan	soil erosion, soil fertility, CO ₂ , sequestration	private/government partnerships, corporate support
B9	Financing forest management with a surtax on resource royalties	British Columbia	Forest management, forest community planning and participation	surtax on resource royalties
B10	Natural resource districts	Nebraska	soil, habitat, and water conservation	taxes, surcharges
B11	A conservation credit system (also related to water resource management)	Wisconsin	water quality, agriculture, rural non point sources	property tax credits, tax incentives
B12	Mitigation banking; purchasing and transferring development rights	U.S.	Agriculture, forestry, land development	obligation bonds, transfer tax, government partnerships
B13	Wetland mitigation banking (this case study is also applicable to water resources)	U.S.	wetland conservation, habitat, water quality	mitigation banks, land credits, private/government partnerships, private land banking
B14	Conservation easements	Ontario	habitat conservation, biodiversity	trust development, tax benefits and related instruments
B15	Conservation trusts in an international context: Global Environment Facility support	Variable	biodiversity conservation	trust fund development
B16	Full revenue retention: avoiding the general revenue trap	Ontario	parks, fish and wildlife habitat, forest fire fighting	revenue retention, privatization, user fees, beneficiary fees

Table 2 continued

Case Study	Subject & Title	Location	Issues	Financing aspects
B17	Eliminating perverse incentives	North America	variable	cost savings, reducing program overlap and contradictions, reallocation of funds
B18	Debt for nature exchanges	Variable	biodiversity conservation, forest conservation, wildlife habitat	debt exchange, trust fund development, donations, private/government partnerships
B19	Corporate and foundation initiatives, CIBC support for Toronto's Waterfront Regeneration Trust	Ontario	land conservation, water resources, participation, habitat restoration	private financing, donations, trust fund development

Table 3 Air quality and resource conservation

Case Study	Subject & Title	Location	Issues	Financing aspects
C1	Reducing CO ₂ emissions through energy efficiency	Toronto	air quality, resource efficiency	loan incentives, private/government partnerships
C2	Implementing improvements in energy management through an energy bank	Iowa	resource efficiency, air quality	private financing with state loan support
C3	Improving industrial processes; National Cleaner Production Centres	Variable	Air quality, water quality, resource efficiency	private/government partnerships, foundation support, multi-lateral financing

A. Water resource management

Case Study A1: Storm water management; demonstrating ecological impacts, Texas

This example demonstrates soil and water conservation work that is being implemented on the local level, and at a relatively small scale, through inter-agency partnerships. Cost sharing by governments may help reduce overall expenses, and improve integration and coordination of efforts.

The goals and objectives of this project are to develop a 58.6 acre park that will demonstrate structural best management practices (BMP) in storm water management and to educate local and regional communities of how reduction in the impacts of non point source pollution (NPS) might be achieved by implementing structural and nonstructural BMPs. The city will examine the potential for enlarging the demonstration area if public response is favorable and project evaluation determines it has been an environmental success.

The demonstration will be constructed on the grounds of a regional recreational complex currently (1996) under design by the city and cooperating agencies. The concept is based on an example from Maryland; the *Fairland Park Stormwater Management Demonstration Area*, and outdoor classroom(established jointly by the USEPA, Maryland Department of Natural Resources, Maryland National Capital Park and Planning Commission, and Prince George's County Department of Environmental Resources). The park will be located along the Rio Grande River at Laredo and will contain recreational facilities and a ecological/wildlife corridor, it will incorporate storm water management techniques throughout the complex. The project provides an excellent opportunity to provide education about the impacts of NPS pollution. It will also provide developers and the community with a model of available BMPs and their relative effectiveness in dealing with storm water quality. The city hopes that the park will serve as a model for land development activities throughout the immediate area and South Texas. As community awareness of ordinance requirements is improved it is likely that overall storm water quality will improve. Financing is provided jointly by the USEPA non point source grant program and the City of Laredo. The project incorporates local recreation and ecological park development with the demonstration of structural and non structural BMPs in storm water management. The project also borrows from an existing model

in another state. Federal and local partnerships have been developed to fund the program.

Case study submitted by: USEPA

For more information contact: USEPA, Office of Water, Washington DC, U.S.A. 20460, quote project 996146040 12 200, Urban runoff, reported in GRTS December 1996.

Case Study A2: Storm water utilities; community and regional approach, Virginia

This example of storm water management through a regional utility employs user fees to help cover costs. The application of the polluter pay based assessments may provide an example for other jurisdictions.

A storm water utility may be used to provide storm water management and flood control services which are most often paid by fees applied landowners. Fees typically increase with size and degree to which a parcel of land is developed. Larger more developed areas will typically contribute more runoff water. In Virginia it was assumed that the utility approach to management would be more acceptable to the public because the revenues generated are dedicated to a specific purpose. There is more often an assumption of greater accountability fostered in part by the fee which is user, or polluter pay, based and the greater the level of use the greater the cost to the user. A tax based on property value which is then distributed to a storm water agency through general revenue is often viewed as being not as fair.

The state of Virginia has implemented 7 storm water utilities in jurisdictions with populations ranging from 104,000 to 420,000 (Chesapeake, Virginia Beach, Hampton, Newport News, Norfolk, Prince Williams County, and Henrico County). Typical residential charges range from \$21(US) to \$48(US) per year.

Norfolk, with a population of 260,000, generates about \$3 million (US) per *annum* for general maintenance and operations. In most instances where utilities are being used for environmental services capital funds are raised through other means, unless a significant increase in user fees is applied. Bond issues, special levies, or contributions from general revenue (local, state, province or federal) may typically be applied. The primary financing advantage of a utility is the provision of services, maintenance, and operations through user fees.

Case study submitted by: Maryland Department of Natural Resources.

Reference: MDNR, 1995, *Report of the Governor's Blue Ribbon Panel, financing alternatives for Maryland's tributary strategies*, MDNR, Annapolis.

For more information contact: Virginia storm water utilities mentioned above, or Maryland Department of Natural Resources, Coastal Zone Management Division, Tawes State Office Building E-2, Annapolis MD, 21401.

Case Study A3: Storm water utility: the benefits of an integrated approach, Kentucky

The management of storm water in this example includes the application of user fees and the development of a storm water utility. The integrative nature of this example, and the use of user charges for storm water services may provide a innovative solution to similar problems in other jurisdictions.

The Metropolitan Sewer District (MSD) serves an area of 375 square miles and a population of about 535,000. The creation of a regional utility occurred in 1987 and resulted in a comprehensive regional approach to storm water management. The utility is publically owned. The communities served are variable in size and the utility also services unincorporated areas. The utility assumed responsibility for abating and managing storm water, regulating developments, for the state of overall surface water quality, and the operation of a flood protection system for the Ohio river. Services include a range of activities from simple basin cleaning to maintenance of several of the world's largest pumping stations.

The development of a comprehensive regional approach to storm water management was a direct result of the problems associated with a previous system. That system divided responsibility among many agencies limited by boundary issues and relatively small budgets. Flood protection was various divided and passed between city and county governments, and the U.S. Corps of Army Engineers. The lack of integration limited the effectiveness of improvement projects and reduced the long term efficacy of planning efforts.

The MSD's Strategic Planning and Finance committee, actually a citizens advisory group, proposed the adoption of a comprehensive regional approach to surface water drainage management and flood protection, to be coordinated by the agency. Local

and county governments, and the MSD accepted the proposal, which was then enabled by the state legislature.

The increase in responsibility (in area and activities) added new costs to the utility's budget. New operation and maintenance responsibilities, and capital expenditure expectations were also realized. The MDS's drainage program is financed entirely by a modest user charge, with single residents paying a flat monthly fee, and commercial and institutional properties paying a fee per 2,550 square feet of impervious surface. The billing system is coordinated with the Louisville Water Company, this approach helps to keep billing costs low.

The implementation of a consolidated, or integrated approach, to storm water management through a public utility rectified the problems caused by the fragmented approach. The problems arose from multiple agencies with poor coordination, compounded by poor funding, a lack of definitive planning, and a backlog of drainage problems. The integrated approach helps by reducing the overall cost of service delivery, providing a venue for strategic and long term planning, and providing a single system for financing through user charges.

Case study submitted by: USEPA report forwarded by Environment Canada.

Reference: Apogee Research, 1992, *Storm water utilities: innovative financing for storm water management*, Water Policy Branch, Office of Policy Analysis, USEPA,

For more information contact: Louisville and Jefferson County Metropolitan Sewer District (MSD), Kentucky, U.S.A. or USEPA, Water Policy Branch, Office of Policy Analysis, 401 M Street, Washington D.C., 20460.

Case Study A4: Storm water management utility: a complete watershed approach, Washington County, Oregon

A watershed based approach to planning and implementation is employed to address erosion and sediment control. Funding is augmented through the application of grading, development, and inspection fees (user fees in principle). The program is implemented through a storm water utility.

Washington County's urbanized areas are served by the Unified Sewerage Agency (USA) which provides management of wastewater systems and urban storm water runoff. In 1990 the USA implemented the basic policies and fee structures of a

surface water management utility. The utility is part of a state mandated effort to reduce pollutants in Washington county's streams and specifically the Tualatin River. The service area conforms mostly to the boundaries of urbanization, the number of people served is about 330,000.

In 1986 an environmental group filed suit in Federal District Court against the USEPA and other agencies to insure that TMDLs were established and implemented for surface waters in Oregon that were identified as "water quality limited". The suit specifically mentioned the Tualatin River. A second suit was filed, relating to the river, against the USA. The Federal district court provided a consent decree that identified several water bodies, including the Tualatin River, as "water quality limited". The decree required formal adoption of TMDLs, waste load allocations, and load allocations.

After the suits were filed, the DEQ conducted negotiations with the USEPA, the environmental group, and the Justice Department to develop an acceptable approach to establishing the TMDLs. The USA was already forming a surface and storm water management plan to address daily loads. The law suits simply hastened planning and implementation efforts already underway.

The utility prepared a storm water management plan to meet planning requirements set by the state Department of Environmental Quality (DEQ). Limits had been set by the DEQ for Total Maximum Daily Loads (TMDL) of phosphorus. By March 1990 all jurisdiction discharging into the Tualatin were to submit plans for meeting TMDL requirements. Planning was carried out by 3 committees, including a public advisory group. Meeting a specified level of pollutant loading requires a complex and comprehensive collection of solutions. An ongoing monitoring program was necessary if effective control of pollution was to be achieved. Monitoring was critical to the refinement of the surface water management program and to overall quality control of management efforts at the least cost.

The program relies on a degree of cooperation and integrated efforts among the state agricultural and forestry agencies (which provide testing, monitoring support, and compliance enforcement support), and the utility. Forestry and agricultural activities provide non point sources that contribute to phosphorus loadings in the basin. A coordinated approach to monitoring and compliance assurance was essential if TMDLs were to be met, and the overall objective of water quality were to be achieved.

The Unified Sewerage Agency has also instituted an Erosion and Sediment Control Program (ESCP). The ESCP is responsible for erosion and sediment control throughout the utility's service area, and sets overall standards and fees while

allocating staffing decisions, inspections, and site visits to local government. Grading fees are charged when a subdivision plan is filed; the developer is charged \$80 (US) for the first acre disturbed and \$20 for each additional acre. Developers pay for plan review and on site inspections for each unit built. A building fee is tied to the property's value. For example, if the final value equals \$100,000 then the inspection fee is \$40 and the review fee is \$24 (65% of the inspection fee). Since inception the ESCP has enforcement authority and has issued more than 40 stop work orders, and imposed civil infraction fines of up to \$100,000 per day.

The Unified Sewerage Agency has taken a "complete watershed approach" to monitoring the effects of pollutants in the Tualatin river. The approach is unique in the sense that the agency is monitoring to meet TMDLs and is measuring the actual effects that best management practices have on water quality. Few storm water agencies have been required to assess effectiveness of their control programs on pollutants. The monitoring program implemented by the utility addresses current understanding of surface water management issues, and provides for controlling the discharge of pollutants in storm water runoff. The Erosion and Sediment Control Program is broad in area, and employs a user pay system to finance monitoring and inspection. The ESCP also has meaningful authority to enforce its provisions. The approach is innovative in the sense that a utility is used to implement a watershed approach to surface water management, and a monitoring program is employed to assess actual effects of management efforts. Integration of efforts will improve efficiency and help reduce overall costs.

Case study submitted by: Environment Canada, and Maryland Department of Natural Resources (MDNR).

Reference, Apogee Research, 1992, *Storm water utilities: innovative financing for storm water management*, Water Policy Branch, Office of Policy Analysis, USEPA,

MDNR, 1995, *Report of the Governor's Blue Ribbon Panel, financing alternatives for Maryland's tributary strategies*, MDNR, Anapolis.

For more information contact: Unified Sewerage Agency, 155 North First Avenue, Hillsboro, OR, U.S.A., 97124. Telephone 503-693-3609.

Case Study A5: Joint federal and state funding for reducing non point source pollution; examples from New Hampshire, Rhode Island, and Texas

Non point sources from agriculture, septic systems, and storm water are the subject of a these multi-agency programs. The programs described here use a cost sharing approach among local and federal agencies. The efforts build on existing initiatives and use county/federal and state/federal cost sharing approaches.

In order to reduce and prevent pollution from agriculture, septic systems, and storm water runoff technical assistance is provided to landowners and municipal officials. This project builds on existing programs offered by the Rockingham County Conservation District in New Hampshire. The project provides consultants in best management practice (BMP), and supports the demonstration of BMPs and related educational programs. Financing is based on existing county conservation district efforts with additional support from the USEPA non point source grants. In this example two levels of government share resources in implementing conservation objectives, the efforts of a conservation district at the local/regional level are augmented by funds provided from a federal initiative. Federal funds augment the resources and program activities provided by local government. The integration of efforts inevitably helps realize savings to both levels of government, and may also insure the stability of funding

In Rhode Island funding was provided by the state government to hire two water quality specialists. The specialists work with the divisions of water resources and ground water and freshwater wetlands in developing comprehensive storm water management policy, and freshwater wetlands water quality protection policy. The project includes the preparation of regulatory provisions and implementation strategies for storm water management. The work has spurred development of designation criteria for outstanding resource waters as a means of protecting the state's high quality waters and valuable habitat from non point source related impacts. Financial support for the short term project is provided by two levels of government. Federal grants are used in this context to support the development and implementation of conservation policy and regulation at the state level. Again, shared resource lowers cost for both levels, and may insure better program delivery and funding stability. The approach also benefits from the integration of efforts and sharing of expertise.

In Texas a local conservation board initiated a project to determine cause and effect relationships of non point source pollution from agricultural land uses on the lower Colorado River. The project encompasses the generation of a land use and soils

database (study) for a project area covering 8 counties, and includes a field level and sub-watershed monitoring effort to correlate land use and management practices with quality of receiving streams. Modeling efforts are being performed to predict pollutant fate within the area. Evaluation of the differences in the water column, sediment, and biological diversity between two sub watersheds will determine what impact the varying agricultural land practices have on receiving waters.

The dominant use of agricultural land is row crops. The first field level project focuses on corn. Land application practices will be acquired from the extension crop production guidelines with direct input from farmers. Specific nutrients and pesticides are being selected for analysis based on the known application taking place. Storm water runoff monitoring has been put in place to help predict pollutant transport on a watershed basis. Local conservation districts and extension agents have secured storm water runoff monitoring sites for the filed project, and 2 watershed in addition. Results from the storm water monitoring will help determine what impacts can be identified from agricultural practices. The water quality model will help predict these impacts on a larger scale.

In order to associate monitoring results with farming practices, a major component to be undertaken is determining the specific farming practices that are being employed within the two sub watersheds. The extension service is performing a survey to describe such activities. A database will be developed within the sub watersheds to define specific practices. The work in this project is being carried out by local conservation boards, local district conservationists, and extension agents. The federal government through the USEPA non point source grants program is assisting by providing financial support. The Texas project demonstrates the importance of government partnerships in providing expertise and funding support at the local level for research and possible mitigation of the water quality effects of agricultural practice.

Case study (examples) submitted by: USEPA

For more information on USEPA non point source grants contact: USEPA, Office of Water, Washington DC, U.S.A. 20460.

Case Study A6: Multiple non point source remediation efforts, Pennsylvania

This project addresses non point source pollution from agriculture, there are also potential aquatic habitat benefits. Cost sharing is employed by agencies to

implement the program's objectives, and overall environmental goals benefit from integration.

This project is an interstate, multi-agency effort to remediate agricultural, silvicultural, septic, and urban runoff problems in a 35,000 acre watershed. The watershed is located in southern Bedford county, PA, and feeds two lakes which provide drinking water for about 50,000 people in Maryland. The creek is a tributary of the Potomac River and water quality in the watershed is severely impaired.

The approach is to implement BMPs on sites identified by a preliminary watershed inventory conducted by the Bedford County Conservation District. Aquatic habitat restoration work will also be undertaken. Remediation work will begin after a study is completed by the Interstate Commission on the Potomac River Basin is completed. The study will determine the relative value of remediation measures, and where funds may best be allocated is applying controls. Funding sources include the Chesapeake Bay Program, the USDA Consolidated Farm Services Agency's Agricultural conservation Program, and the USEPA non point source grant program. Support is also provided by local and state governments. The project provides an illustration of integrated planning for watershed remediation and water quality control, using limited shared resources.

Case study submitted by: USEPA

For more information contact: USEPA, Office of Water, Washington DC, U.S.A. 20460, quote project 003498950 19 00, cross cutting NP, reported in GRTS December 1996.

Case Study A7: Storm and surface water utility, Washington State

The storm water utility described here has implemented user fees to help cover operating and capital costs. The utility approach may provide a financing alternative for local governments that presently fund such programs through general revenue.

The Bellevue Storm and Surface Water Utility is among the oldest in the U.S.A. While most such utilities follow a standard fee model, this utility employs a complex fee structure which differs from most approaches. User fees are based on the percentage of impervious surface and the number of acres within a category of user. The category of user is determined by the percent of impervious land surface. A coefficient is determined and then multiplied by the number of acres in the holding.

New developers will either buy into the utility's system or build on site storm water management controls. The utility has been successful in generating revenue and reduces runoff while commanding customer support. The operating budget (1995) was \$8.7 million (US), debt service is 1.9 million for capital works, and approximately \$300,000 is set aside each year for a capital investment program.

Case study submitted by: Maryland Department of Natural Resources.

Reference: MDNR, 1995, *Report of the Governor's Blue Ribbon Panel, financing alternatives for Maryland's tributary strategies*, MDNR, Anapolis.

For more information contact: Finance and Budget, Utilities Department, 11511 Main Street, Bellevue WA, 98009, U.S.A.

Case Study A8: Restoration and protection of water resources, Ohio

The restoration of water resources is being supported by the creation of an revolving fund. The fund employs a linked deposit approach that is supported by joint private and public initiatives. The program is voluntary and seeks to address rural non point source pollution from animal waste, fertilizers, pesticides, and sediment.

The Killbuck Creek Watershed Management Project focuses on the restoration, protection, and preservation of the water resources of the Killbuck Creek watershed located in Wayne and Holmes Counties in the northeast portion of Ohio. Utilizing innovative "Linked Deposits" from Ohio's State Revolving Fund, (SRF) funds are made available through local banks to farmers who voluntarily implement Best Management Practices on their farm. The results of this voluntary program have been a reduction in the amount of animal wastes, sediment, pesticides and fertilizers in the Killbuck Creek Watershed.

The Linked Deposit program was developed in Ohio in 1993 for the Killbuck Creek Watershed. Since that time, four other Ohio watersheds (Black River, Stillwater River, Darby Creek, and Indian Lake) have begun similar programs. Administrative funds were used from Ohio's SRF (called the Water Pollution Control Loan Fund) were used to develop the *linked deposit mechanism*. State funds in the WPCLF (from bond sales and loan repayments) are used for the ongoing implementation of the program. Approximately \$1 million has been utilized in the Killbuck Creek watershed, and an additional \$1.7 million has been used in the four other watersheds. Modelled on an existing program in Ohio (for another purpose), the WPCLF Linked

Deposit Program is used solely for financing BMPs that result in a water quality benefit.

To qualify for a linked deposit loan through the WPCLF, the applicant must meet 4 criteria; 1) own property in a watershed with a NPS watershed management plan approved by Ohio EPA; 2) have a Soil and Water Conservation District (SWCD) approved farm conservation plan; 3) possess a SWCD approved certificate of qualification listing the items eligible for a WPCLF Linked Deposit loan; 4) borrow funds from a bank or other lending institution participating in the WPCLF Linked Deposit Program. Once the lender has completed its review of the applicant's proposal and made its own credit worthiness determination, the lender establishes an interest rate for that individual and submits an investment request form to the Ohio EPA. Ohio EPA then purchases a Certificate of Deposit at a reduced interest rate in that lending institution. The reduced rate of return that the WPCLF receives on its investment is passed on to the applicant in a reduced rate of interest on the loan. This linkage between the state's deposit and the applicant's loan at a reduced interest rate gives the name to the program.

Case Study submitted by: Ohio EPA - DEFA

For more information contact: Bob Monsarrat, Jerry Rouch, or Kevin Hinkle, Ohio EPA - DEFA, P.O. Box 1049, 1600 Water Mark Drive, Columbus, Ohio 43216-1049, U.S.A., Telephone 614- 644-2798.

Case Study A9: Improving water quality through land use practices, Black Earth Creek Priority Watershed, Dane County, Wisconsin

The project uses partnerships between government, conservation groups, and landowners in order to implement rural stormwater management objectives and reduce costs by sharing financial resources. Landowners contribute and benefit from enhanced property values.

This example addresses water quality and aquatic habitat through improving land use practices. The project improves water quality and aquatic habitat by changing the land use practices in the surrounding watershed. For the most part, sediment and nutrient runoff is decreased by improving agricultural management practices. Trout streams are improved by making the channel narrower (with rock rip rap, for example) and deeper and by fencing livestock out of the stream.

The project is largely funded by the State Department of Natural Resources and the Dane County Land Conservation Department. Local landowners also contribute. The part of the project most successful in attaining non-governmental financial support is the stream bank and fish habitat work that is done. Frequently a fishing conservation group, Trout Unlimited, supplies partial financing for stream bank work.

The budget has been variable with several million dollars having been spent on the project within the last 10 years, funds have also been contributed by supplied by Trout Unlimited, a non government conservation organization. The project uses partnerships between government, conservation groups, and landowners in order to implement environmental objectives and reduce costs by sharing financial resources. Landowners contribute but may benefit though enhanced property values and better resource management .

Case study contributed by: Dane County Land Conservation Department

For more information contact: Black Earth Creek Watershed, c/o Dane County Land Conservation Department, 1 Fen Oak Court, Madison, WI 53704 U.S.A.

Case Study A10: Improving water quality and energy consumption by reducing farm chemical use, Iowa

Iowa has instituted a program to improve resource use efficiency and address rural non point source pollution through by reducing farm chemical use. Increases in energy efficiency are also an aspect of this approach. Public and private partnerships are a key element.

As a leading agricultural state, Iowa faced substantial problems from non point source pollution of surface waters and groundwater statewide. Research in the late 1970's and early 1980's revealed extensive regional problems with nitrate contamination of water supplies that have evolved over time, related to the extent of intensive row-crop production. As well, the realization that pesticides were entering ground and surface waters, brought these issues into the the public agenda.

The intent of Iowa's Agricultural Energy Management Programs has been to help farmers make the connection between energy, the environment, and their economic well-being. The program was created in 1981. These programs were developed to accelerate the adoption of improved farm management practices that reduce environmental impacts of agriculture, including the effects of nutrients, pesticides, sediment, and animal waste on surface and groundwater quality; reduce consumption

of non-renewable energy resources; and enhance the efficiency and profitability of farm management.

Iowa's Agricultural Energy Management Programs, which have been implemented with oil overcharge funds, have assisted Iowa farmers increase profitability by avoiding the use of 2.4 billion pounds of nitrogen fertilizer, which is equivalent to 604 million gallons of diesel fuel. Cost savings from the onset of the program total \$362 million. The success of these programs required the cooperation and collaboration of many institutions. The programs involve all of the key energy and farm agencies and organizations who have helped farmers implement more energy efficient, financially sound, and environmentally beneficial practices.

Case study submitted by: Iowa Department of Natural Resources

For more information contact: Sharon Tahtinen, Executive Officer, Energy Planning and Technology Transfer Section, Iowa Department of Natural Resources
Wallace State Office Building, Des Moines, Iowa , 50319, U.S.A.

Case Study A11: Water quality project support; implementing a revolving loan fund, South Dakota, Washington State, & Delaware.

Addressing rural non point source pollution that originates from agricultural practices is the primary objective of this program. Revolving funds have been initiated to support projects. The self sustaining nature of this approach may have transferability to other issues and regimes.

In South Dakota in order to help communities comply with tougher environmental standards the state amended its revolving loan program (SRF) to include groundwater protection as an eligible environmental infrastructure project. With the approval of the USEPA the SRF was made available to offset an estimated \$28 million of solid waste handling and disposal facilities that will entail groundwater protection. The SRF program links solid waste management with groundwater impacts and makes water quality funds available to deal with the cause rather than the effect.

Washington and Delaware use state revolving funds to finance septic remediation. In Washington the state approves loans to cities and counties as the borrowers of record. The local government then makes loans available to private individuals and small businesses, specifically to fix septic problems. The local government determines the terms or repayment, specifically whether the borrower must pay a loan obligation fee without annual interest, or pay a low annual interest rate without fee.

In Delaware the state lends funds with low interest directly to homeowners and farmers. A resident is evaluated on the basis of need and current employment. The state places a lien on the property in insure repayment. If the borrower is an individual then up to 20 years are allowed to repay the loan. If the borrower is a farmer and is using the loan to cover agricultural wastes, shed, or composting, then 7 years are allowed.

The revolving fund concept provide loans that must be repaid, rather than one time non repayable grants. This allows a constant fund to be maintained, rather than relying on a short term program than may all too often not be renewed when funding limits are exhausted.

Case study submitted by: Maryland Department of Natural Resources.

Reference: MDNR, 1995, *Report of the Governor's Blue Ribbon Panel, financing alternatives for Maryland's tributary strategies*, MDNR, Anapolis.

For more information contact: South Dakota Department of Environment and Natural Resources.

Washington State Department of Ecology, Wolympia WA, U.S.A. , Telephone 206-385-9140.

State Revolving Fund, Delaware Department of Natural Resources, Dover, DE, U.S.A. Telephone 302-739-5081.

Case Study A12: Wastewater treatment; private management and financing, Maryland

Public and private cooperation has led to the development of a private waste water treatment facility. This provides an alternative to options that are more often solely financed and managed by public agencies.

Anne Arundel county in Maryland is one of the state's fastest growing communities. The population is about 400,000 and the land area is 418 square miles, both commercial and residential development have grown significantly. The county government has turned to developer financing alternatives to accommodate the construction of a new wastewater service infrastructure.

In 1990 the Maryland City Water Reclamation Facility was dedicated, marking a partnership between the county and Russett Center Limited. The partnership

provided that the county issue bonds in the amount of \$29 million to finance construction of the new plant and waterlines. The completed facility supplies water and sewer capacity to service Maryland City, Russett and nearby lands. Russett is a planned community located within the Washington Baltimore corridor. It is bordered by the Little Patuxent River and a 150 acre wetland area which is maintained as a wildlife preserve, the entire site is about 613 acres, 75% will be developed. The sewage treatment plant includes a system offering biological nutrient removal to help prevent nutrients reaching from reaching receiving rivers and marine waters.

The Russett developers and two other development interests have assumed the responsibility to pay off 80% of the bonds and will in turn receive 50% of the new system capacity. This gives the county a new state of the art sewage treatment facility and provides Maryland city with water and sewage service at less cost to the taxpayer.

Case study submitted by: Maryland Department of Natural Resources.

Reference: MDNR, 1995, *Report of the Governor's Blue Ribbon Panel, financing alternatives for Maryland's tributary strategies*, MDNR, Anapolis.

For more information contact: Maryland Department of Natural Resources, or Russett Center Limited, Telephone 410-951-4900.

Case Study A13: Developer financing of wastewater treatment, Pennsylvania

The provision of sewage treatment services often involves costly investment by public agencies. This example provides an alternative through developer financing, and the application of user fees and surcharges.

Developer financing often involves private developers who finance the construction or expansion of infrastructure systems in return for the right to develop properties. Usually this form of financing is controlled by local government, and arrangements are negotiated on a project specific basis or mandated through an ordinance which may specify the required contribution based on the size of facility or nature of the development. Contributions may be in the form of funds or the construction of projects such as sewer lines or entire sewage treatment plants.

The Sewer Access Rights Program in the Upper Merion Municipal Utility Authority in Pennsylvania provides an example of how developer financing can be implemented. This project was created to finance a sewage treatment plant

expansion project, this program required customers to purchase capacity in advance to guarantee future connection to the system. The fees paid by these future customers were then used to finance construction of increased sewage treatment capacity. The program therefore insured that construction of the infrastructure necessary to support economic development was carried out, while not placing a burden of existing system users. Based on the sale of capacity for equivalent dwelling units (EDU), US\$3,200 is received for each EDU capacity sold, at 200 gallons of sewage per day. Nonparticipants have no guarantee of access to sewage treatment. As of 1995 the program had collected \$7.2 million in connection fees from 167 applicants.

Some American states have instituted legislation or other means authorizing local governments to use developer financing for some projects. Other states have statutes that attempt to standardize implementation of fees. For example, Pennsylvania adopted legislation in 1990 to standardize the methodology for implementing water and sewer tapping fees to recover the cost of additional system capacity that constructed to serve new customers.

Case study submitted by: Maryland Department of Natural Resources.

Reference: MDNR, 1995, *Report of the Governor's Blue Ribbon Panel, financing alternatives for Maryland's tributary strategies*, MDNR, Annapolis.

Ernst and Young, 1995, *Infrastructure financing study*, Ernst and Young, Washington D.C.

Case Study A14: Clean water districts, Washington State

This example employs user fees and taxes to support non point source control efforts, and shoreline habitat restoration. The fee system is applied to those who benefit directly from cleanup efforts. A system of grants and loans also supports the program.

In 1992 Washington State passed a provision for the creation of shellfish protection district (clean water districts, CWD). The intent was to facilitate non point source control efforts. The districts may also be created by a count government or by referendum. In instances where the Department of Health has issued a downgrade or closure of a shellfish area due to non point source pollution (NPS), the county is required to establish a CWD within 180 days. The boundaries of a CWD may cover a watershed, entire county, or parts of several counties (by interjurisdictional agreement). Once a CWD is established a citizens advisory committee determines priorities for controlling NPS pollution. Counties finance CWD programs through

taxes, grants, reasonable fees, rates, charges for specified protection programs, and grants or loans from other sources. The specific combination of revenue sources is determined by the county's legislative authority.

In Mason county property owners in the Lower Hood Canal CWD are assessed \$52 per year for any structure with an on site septic system. The fee for complexes with multiple connections to a septic system is \$250 per year (\$450 for state parks). In addition tideland property owners are assessed \$27 per year because they are perceived to benefit the most from NPS control. Revenue is augmented by state grants, some of which may require a 25% local government match.

In the Totten-Little Skookum CWD the assessment for households with on site septic systems is \$52 per year but there is no fee for tideland property owners. Shellfish growers have agreed to contribute \$18,000 per year for the first two years. But the growers have maintained that access to clean water for their fisheries is a right, not something for which they should be charged. This CWD also receives funds from a 3 year \$369,000 state grant which is matched by the county.

Case study submitted by: Maryland Department of Natural Resources.

Reference: MDNR, 1995, *Report of the Governor's Blue Ribbon Panel, financing alternatives for Maryland's tributary strategies*, MDNR, Anapolis.

For more information contact: Puget sound Water Quality Authority, Telephone 206-493-9161. Mason County Commissioner's Office Telephone 206-427-9670, or Shorelands and coastal Zone Management Program, Telephone 206-407-6787

Case Study A15: Drinking water supply protection project Fort Wayne, Indiana

The control of erosion and its impact on municipal drinking water is partly achieved through a public/private initiative. The municipal government finances a program that makes efficient and less erosive farm till equipment available to agriculture within the watershed.

Fort Wayne Indiana takes its drinking water from the St Joseph river, which has one of the most erosive watersheds in North America; largely due to cropland erosion. Removing sediment from the drinking water supply has been costly for the city's water utility. The city has developed a program to make no till drill equipment (moldboard plowing) available to farmers up river. The program is administered with the assistance of the local soil and Water Conservation District (SWCD). The

SWCD then makes equipment available to farmers within the watershed on the basis of a priority list of lands that would benefit most from no till farming. The SWCD is responsible for maintenance and service, so risk to the farmer is minimal. During the off season the equipment is made available to city works department, which uses them to power pumps during the flood season. By the middle of the year following the introduction of the program the cost of the equipment had already been recovered by the city. The cost is about \$52,000 (US) per tractor/plow combination.

Case study submitted by: Maryland Department of Natural Resources.

Reference: MDNR, 1995, *Report of the Governor's Blue Ribbon Panel, financing alternatives for Maryland's tributary strategies*, MDNR, Anapolis.

For more information contact: Allen County SWCD, 2010 Inwood Drive, Fort Wayne Indiana, 46815, Telephone 219-422-3373.

Case Study A16: Water pollution control monitoring project Long Creek watershed, North Carolina

The project illustrates the potential for the application of shared cost funding mechanisms with an integrated planning approach, and within a rural urban setting. A shared resources approach may result in overall savings overall to public agencies

This watershed is the site of a 9 year USEPA National Monitoring Program Project initiated in 1993. The objective is to document the effectiveness of pollution controls. Water quality and land use monitoring will be used to evaluate specific best management practices (BMP) at dairy feedlots, crop fields receiving animal waste application, and municipal water supply intakes downstream from eroding crop land. Partial funding for agricultural BMP implementation is available from the North Carolina Agricultural Cost Share Program and from a USDA Water Quality Incentive Project funded to support agricultural management practices in the watershed. Funding from the USEPA non point source program supports accelerated design and implementation of additional BMPs including stream bank stabilization, livestock exclusion, urban storm water controls, and the establishment of wildlife habitat.

Case study submitted by: USEPA

For more information on USEPA non point source grants contact: USEPA, Office of Water, Washington DC, U.S.A. 20460.

Case Study A17: Urban resource partnership, Philadelphia

This large scale urban program is partially financed by government agencies and receives support from a range of non government organizations. The program's objectives are varied, but concentrate on education and local restoration initiatives. The project illustrates the potential for the application of multiple funding sources within a integrated planning, and complex urban, context. Shared resources and a multiple use approach may result in overall savings overall to public agencies.

The city of Philadelphia is one of four American cities that received a 1995 USDA Urban Resources Partnership Grant. The objective of the project is to form a long term partnership between federal and state agencies, local government, environmental and community organizations, and local residents to develop, enhance and protect the natural resources of the city. The Philadelphia Urban Resource Partnership is based on a team of public, private non profit, and community based organizations that will help deliver environmental services to Philadelphia communities. The partnership provides leadership, education, and assistance to enhance, restore and sustain urban natural resources. The partnership will ideally help enhance the quality of urban life through community involvement and action to protect and restore natural resources within the city. The project partners include a broad range of state and federal conservation agencies, local governments, academic institutions, foundations, and environmental groups (about 21 organizations participate).

Case study submitted by: USEPA

For more information contact: USEPA, Office of Water, Washington DC, U.S.A. 20460. Quote project 003498960 07 000 cross cutting NP Philadelphia urban resource partnership, reported in GRTS, December 1996.

Case Study A18: Partnership funding for a water conservation newsletter, Colorado

Financing and logistical support for this extension and education project are provided on a shared cost and shared resource basis. The USEPA grant supports production, while other agencies, including the state university, contribute other services. The shared approach is an integral part of the project's continued viability.

A USEPA non point source grant supports a newsletter with a distribution of about 24,000 copies per issue. The objective of the newsletter, *The Conservator*, is to

inform and educate people in Colorado about non point source pollution and related water quality issues. The USEPA non point source grant covers the cost of printing and distribution (publication occurs 6 to 5 times per year). Issues covered in publication include causes of NPS pollution and best management practices. Articles are submitted and screened and selected based on their relevance to the publication's objectives. A steering committee determines the types of information that will be included in each issue. Services to develop, edit, and distribute the newsletter are donated to the project by agencies such as the Colorado Association of Soil Conservation Districts, State Soil Conservation Board, Soil Conservation Service, Water Quality Control Division, the Colorado Non point Source Task Force, and the NPS Information and Education Work Group. Other contributing agencies include Colorado State University Cooperative Extension, the division of Wildlife, the Division of minerals and Geology, Department of Agriculture, and the Bureau of Land Management.

Case study submitted by: USEPA

For more information contact: USEPA, Office of Water, Washington DC, U.S.A. 20460. Quote project 998186940 01 000 cross cutting NP, Colorado conservation newsletter, phase 3, reported in GRTS, December 1996.

Case Study A19: Wetlands enhancement and education Snake River wetlands, Colorado

This project combines funding from government, lottery and business sources. The role of the developer in implementing and supporting remediation and education efforts is particularly notable. Economic development and conservation objectives have been, albeit in relatively small area, accommodated by a shared cost and resources approach involving not just government but also business.

This project is supported in part by a grant from the USEPA non point source program. The objective is to provide education about urban runoff control and wetlands enhancement. The Keystone Resort, in Summit County Colorado, undertook to construct sediment basins and to create wetlands for the reduction of phosphorus and other pollutants that originate from parking areas. About 2 acres of wetland were to be constructed and existing natural wetlands adjacent to the resort enhanced. The Snake River runs along the edge of the resort. An education component consisting boardwalks and interpretive signs was also constructed. A local science school has used a portion of the funds to develop a curriculum based on the nearby wetlands. The basin has a phosphorus wasteload allocation (set limit

for loadings) and there is a local program to control phosphorus from both point and non point sources.

The runoff control and wetlands enhancement project is part of a long range plan for resort development and operations which will help restore some wetland functions and improve riparian habitat along the Snake River. Major funding is also provided from the Colorado Lottery funds for parks and open space, as well as sponsor funds, to pay for wetlands mitigation and the entire cost of the boardwalks and interpretive signage.

Case study submitted by: USEPA

For more information contact: USEPA, Office of Water, Washington DC, U.S.A. 20460. Quote project 998186940 06 230, commercial, Snake River wetlands, reported in GRTS, December 1996.

Case Study A20: Improving household water use efficiency, New York

By providing financial incentives for structural improvements local government may realize significant savings in water consumption. These very brief examples show potential approaches for large and small communities.

This project addresses water efficiency, in particular reducing consumption and in sewage flows. The New York City Department of Environmental Protection is completing a large scale program that provides financial incentives for property owners who replace older toilets with more water-efficient models. From a financing perspective, the essential issue in this program is that the funds used for this project are considered a capital expenditure, rather than an expense budget item. This provides a much smaller impact on water/sewer rates and allows the efficiency program to be evaluated from a financial perspective on an "even playing field" with other water supply and wastewater expansion projects.

On a smaller scale the Elgin County housing Authority (St. Thomas, Ontario) has introduced a program to reduce water consumption in some of its properties by improving the water efficiency of toilets. Toilets were retrofitted with devices that closed the refill mechanism earlier thereby using less water. The water usage for each building was averaged over the previous 2 yrs (for each month) and this served as the base from which to calculate usage. The savings were calculated by subtracting the actual from the base usage. The contractor responsible for the retrofits was paid the

equivalent cost of the water saved over a specified period of time, depending on the cost of the water.

Case Study submitted by: NYC Department of Environmental Protection

For more information contact: Warren Liebold, Director of Conservation, NYC Department of Environmental Protection, 59-17 Junction Blvd - 13th Floor - BCCS, Corona, New York, U.S.A. 11368-5107.

For information on the St Thomas example contact the Elgin County Housing Authority, St Thomas, Ontario, Canada.

Case Study A21: Fish hatchery management; NGO participation, British Columbia

In many jurisdictions conservation work traditionally financed by government is being scaled back. This example indicates the potential for transferring some activities to NGOs. The development and operation of fish hatcheries by NGOs has broad application in most regimes.

This example involves fish hatchery enhancement, compensating for habitat loss, by producing salmon within a hatchery setting. The Noons Creek Hatchery, a non profit organization, private individuals, and the Port Moody Ecological Society created a fish hatchery on private land, and later expanded to land owned by the municipal government. Construction of the hatchery was done largely by volunteer labour, Canada's Department of Fisheries and Oceans provided some technical and financial support. The hatchery supports an education program as well. Financing is accomplished mostly through volunteer support, donated land (private and municipal), some government support. The program is innovative because a community group operates the type of facility that in Canada is more commonly run by government. Government provides logistic and periodic funding support.

Case study submitted by: Academic source.

For more information contact: Port Moody Ecological Society, 300 Ioco Rd. Port Moody British Columbia, Canada, V3H 2V7.

Case Study A22: Watershed based trading

The development of watershed based trading in effluent permits is being encouraged and developed within the U.S. The approach may provide substantial

cost and pollution reduction benefits to industry and the public. The approach may be applicable to other sectors, including harvest permits for renewable resources. The examples discussed here are quoted from USEPA Report 800-R-001.

Though watershed based trading in effluent permits is relatively new in the U.S. it is being increasingly applied. Generally the assumptions regarding benefits focus on economic benefits such as cost reduction for industry and the realization of overall economies of scale and treatment improvements. Potential environmental benefits include greater reduction of pollution that regulation might encourage through economic incentives, and the potential for addressing a range of environmental goals such as the protection or restoration of natural systems within a watershed context.

The USEPA has developed a draft framework (*Report EPA 800-R-96-001*) that requires trading participants to meet minimum standards. The objective is to realize improvements, and not allow degradation of water quality. The application of the program on a watershed basis allows for some sense of ecological rationale to be included in developing requirements and objectives. The examples described below are quoted from the EPA draft framework, and Draper *et al* (1997).

The Maryland Department of Natural Resources accept payment in lieu of mitigation under certain circumstances from Clean Water Act Section 404 and state permit holders. Fees are deposited into a trust fund that pays for larger restoration projects conducted by the department and its contractors. The fund has paid for more than 15 projects and deposit are over US\$200,000.

North Carolina's Tar-Pimlico river basin contains a group of wastewater treatment plants that can receive credit for nitrogen loading reductions by paying \$65 per kilogram of desired reduction (animal waste, \$42 for cropland) into an Agricultural cost Share fund that supports best management practices. In comparison, the dischargers estimated that technological upgrades would have provided nitrogen reductions at a cost of \$25 to \$500 per kilogram. The point sources are treated as though they were a single source for the purposes of implementation. The program has been in operation since 1992 and has provided incentives for point sources to increase operation and maintenance efficiency. The ability of point sources to reduce loads below the limit through plant operational improvements resulted in few trades until recently. Several important features of the Tar-Pimlico example are the formation of a voluntary association created to meet the emissions targets set by the USEPA. The association established the trading mechanism.

At Lake Dillon, Colorado, four wastewater treatment plants discharging into the lake receive credits for phosphorus load reductions by purchasing NPS reductions. Non

point sources are the focus of the trading program. The program began in 1984 and improvements treatment technology and slower than estimated growth has resulted in only a few trades. The trading ratio is 2:1 and credits can only be obtained for abatement of NPS's that existed before 1984. Decision making is at the local level and a watershed committee acts as the clearing house for all trades.

Dade County, Florida, provides permit holders under Clean Water Act Section 404 the option of paying a fee to satisfy mitigation requirements. Funds are allocated to a wetland mitigation trust that supports improvements in the East Everglades. The fund has received over \$500,000.

Case study submitted by: USEPA report forwarded by Environment Canada

References: USEPA, 1996, *Draft framework for watershed based trading*, USEPA 800-R-001, 1996, USEPA Washington.

Draper and Assoc., M. Fortin, BOS Engineering, I.W. Heathcote, Hall and Assoc. 1997, *Phosphorus trading program evaluation and design, Bay of Quinte Remedial Action Plan*, (Available from Environment Canada, Ontario Region).

For more information contact: USEPA, Office of Water, Washington DC, U.S.A. 20460

Case Study A23: Water rights exchange in California

In California's Metropolitan Water District a projected water supply deficit led to the consideration of structural and non structural options. Alternatives were compared on the basis of cost and water supplied. A conservation option that included an exchange of water rights was chosen. The development of an institutional response to supply deficiencies resulted in lower costs, and water conservation. Costly infrastructure expansion was avoided, savings to public agencies, and environmental and use conservation objectives were aided. This case study is adapted directly from Bhatia (1995).

In California the Metropolitan Water District (MWD) was facing rising demand for water and the possibility of 140,000 acre feet shortfall in supply. The MWD considered four options for addressing the deficit; constructing reservoirs in central California, enlarging the Shasta Dam, demand management through price increases, and water conservation in the Imperial Irrigation District (IID). The first two options were structural approaches that would add capacity to the existing delivery system. The latter two were institutional approaches that sought to modify consumption

behavior. Each of the options would have addressed the deficit. The options were compared using the amount of water that would be supplied and the cost per acre foot. Conservation in the IID became the favored option. The price paid by agriculture was comparatively low (US\$9 per acre foot), there was little incentive to conserve, and loss from the delivery system due to evaporation and leakage was widespread.

The MWD invested \$10 million in the IID for conservation in return for 100,000 acre feet of water. The IID needed little persuasion to participate because it was under pressure from environmental interests to address the damage being caused by high volumes of wastewater. No farmers served by the IID were to get less water, and it was evident that the value of water saved would be of much greater value to the MWD than expanded irrigation. The economic benefit of water in the IID was estimated to be \$35 per acre foot, to the MWD this was considerably less than the cost of developing other supplies.

Information provided by: The World Bank

Reference: R. Bhatia, R. Cestti, and J. Winpenny 1995, *Water conservation and reallocation: best practice cases in improving economic efficiency and environmental quality*, UNDP - World Bank, Washington.

For more information: See the above reference, or for information on related topics contact: Water and Sanitation Division, The World Bank, 1818 H Street NW, Washington, DC, U.S.A. 20433.

Case Study A24: Water auctions, Victoria State, Australia

The allocation of water through an auction was intended to maximize the return on public investment, insure equity in distribution, and aid in the recovery of a portion of the capital cost of infrastructure. This approach resource allocation highlights the potential for cost recovery and allocation on a basis that minimizes the cost to public agencies. Financing for development can be supported by the realization that full recovery of cost is likely. This case study is adapted directly from Bhatia (1995)

About 75% of the water diversion in Victoria State is distributed through publically financed irrigation systems. About 80% of this water was used for pasture. The state had a policy of promoting settlement by small farm holdings and supported this in part by making water available based on the amount of land held. The price of water was based on the cost of the cost of operating and maintaining the system. Water is

also allocated through water rights, licences, and permits. Private diverters account for 10% of irrigation water and pay AUS\$0.003 to 0.004 per cubic meter to cover direct and administrative costs. Private diversions serve market gardens, orchards and vineyards, in contrast to the public irrigation districts which serve mostly small holdings. The development of infrastructure has reached the point where consumption now equals the availability from most streams. The completion of the Dartmouth Dam has insured water supply for the region, making a further 35 million m³ (MCM) available for private consumption. The Department of Water Resources used an auction to allocate this water in a manner that maximizes return to public finances, insures equity, and aids in the recovery of a portion of the capital cost.

The auction was limited to private irrigation diverters who bid on 15 year licenses based on willingness to pay for 1000 cubic meters of water. As long as the reserve bid was matched the highest bidder could have an amount of up to 10% of the available water. Water not taken was available to other bidders at the same price. The reserve bid was \$0.10 per m³, this is assumed to be below the value of water to many farmers. Of the 31 MCM of water available 23 were sold by auction, most at the reserve price. Higher prices were paid for smaller volumes, which tended to be used for high value crops. The objective of allocating most of the water to high value use was not met, most of the water went to pasture. Some producers bought water for drought security.

The auction was include provisions that prevented it from maximizing bid prices and revenues. The staging process and volume limits were intended to protect small holdings and prevent large farms from taking most of the water. Urban consumers and larger public irrigation districts were excluded from bidding. This helped protect small farm holdings. The disadvantage of this approach to equity was that benefits to public finance from higher prices were lost, and the incentive to put the water to use in high value crops was negated.

Information provided by: The World Bank

Reference: R. Bhatia, R. Cestti, and J. Winpenny 1995, *Water conservation and reallocation: best practice cases in improving economic efficiency and environmental quality*, UNDP - World Bank, Washington.

For more information: See the above reference, or for information on other topics in water financing contact: Water and Sanitation Division, The World Bank, 1818 H Street NW, Washington, DC, U.S.A. 20433.

B. Issues in land use conservation: forestry, parks, and wildlife

Case Study B1: Improving national park revenue; enhanced user fee collection, Parks Canada, Western Region

Most national park systems have implemented user fees. In remote parks and back country locations the collection of fees can be a problem. The use of automated collection systems allow park managers to capture revenue from such sites. In Canada the approach resulted in increased revenue. Automated collection has broad applicability, not only in North America but in the developing world where such revenues may be applied to support environmental objectives such as biodiversity conservation.

Pacific Rim National Park is located on the western side of Vancouver Island on Canada's Pacific coast. The park most of the shoreline and immediate forest between the communities of Tofino and Ucluelet. While most of Canada's large western national parks have gated entrances where user fees are collected this was not considered a viable option given the parks location and the resulting traffic between the two communities. The park has small number of camping areas, and many visitors stay in facilities outside the park's boundary. In order to improve the collection of park visitor fees a series of pass dispensing machines were located in parking lots adjacent to popular beaches and trail heads. The approach has resulted in significant improvements to park revenue. Last year the use of unattended machines to dispense park passes was extended to Glacier, Mount Revelstoke, Banff, Jasper, Kootenay, Yoho, Elk Island, and Waterton National Parks (located in Canada's Rocky and Columbia mountain ranges). Several of these parks contain some of the most heavily visited natural areas in North America and indeed globally.

Several of the parks are crossed by major highways. Thru traffic is not charged a fee. While most of the parks have toll gates that collect park fees and issue permits Glacier and Mount Revelstoke parks do not have gates and previously relied on having visitors purchase passes from the park office at Rogers Pass (both parks are administered from the same office). The other parks experience instances where visitors who are ostensibly traveling thru decide stop and use park facilities, often on a day visit basis. In order to improve revenue collection from day visitors, and from visitors to parks without toll gates Parks Canada has installed pass issuing machines

that collect fees at frequently visited sites. The machines accept money (coin and paper) or credit cards and will issue day or extended passes.

The Parks Canada experience indicates that the success of unattended pass machines is variable depending on the location. Machines at relatively remote locations have lower levels of use, which may be a result of their location, that remote machines accept only credit cards, and lower rates of use for such sites. The machines seem to be most successful if located in a parking lot.

Parks Canada's pass dispensing machines are state of the art and each costs about CDN\$15,000 each to install. There can be significant maintenance issues — money collection, data management, and provision of electricity. In remote locations solar energy may be used and only credit cards accepted since the equipment used to read paper money is more energy consuming. Not all machines would necessarily use electricity. Vandalism and theft have not been a problem. There are no reported instances of either the robbery or destruction of a machine of the type Parks Canada presently uses.

The use unattended machines for collecting park fees is not a blanket substitute for attendants. The machines augment revenue collection. But there may be instances where a conservation agency may want to introduce a user fee but cannot justify the expense of providing an attendant. Such machines may be the appropriate response in many instances. They can also be used to sell fishing or day backpacking permits, or publications such as trail maps and park guides. Parking fees may also be charged at conservation sites as a way of improving revenues (this is not uncommon at National Trust Sites in Britain). Such improvements in revenue collection are ultimately only useful if the revenue is allocated to the particular conservation purpose. Parks Canada operates under a system of full revenue retention, so any increases in revenue collection will be used within the National Parks. In jurisdictions where ecotourism has the potential to become an important source of revenue, the use of automated collection systems might be very useful. They can also be configured to apply differential fees to residents and non residents.

Case study submitted by: Parks Canada, Western Region

For more information contact: Don Sears, Back Country Manager, Banff National Park, Parks Canada, P.O. Box 900, Banff, Alberta, Canada, T0L 0C0, Telephone 403-762-1547.

Case Study B2: Wildlife conservation; Georgia's state license plate program

The sale of special licence plate tags is used in this example as a revenue generating tool. The funds raised are allocated to Georgia's Non Game Endangered Wildlife Program. This approach can likely be applied in most jurisdictions in support of a range of environmental objectives.

The Georgia Department of Natural Resources, Wildlife Resources Division, as with other American fish and wildlife agencies, receives little state funding for its Non Game Endangered Wildlife Program. This program provides conservation and education projects for wildlife species not hunted, fished, trapped, or harvested in any way. Most of the funding from this program comes from the Endangered Species Act, an income tax checkoff (a voluntary tax allocation available on income tax forms) and voluntary contributions. In recent years, the program has operated on less than a US\$400,000 budget with very limited staffing. The Georgia Department of Natural Resources, Wildlife Resources Division, like many other state fish and wildlife agencies, receives little state funding for its Non Game Endangered Wildlife Program. This program provides conservation support across the state.

On January 1, 1997, the Non game-Endangered Wildlife Program introduced a new wildlife conservation vehicle license plate featuring a bobwhite quail in a longleaf pine/wiregrass habitat. The license plate sells for \$15 above the cost of normal tag renewal fees. \$14 of the \$15 goes directly to the Wildlife Conservation Fund which benefits the Non game-Endangered Wildlife Program. The other \$1 is returned to the county which sells the wildlife tag. In the first two weeks of the year alone, more than 65,000 license tags had been sold.

Case Study submitted by: Georgia State Department of Natural Resources, Wildlife Resources Division

For more information contact: Georgia State Department of Natural Resources, Wildlife Resources Division.

Case Study B3: Conservation research; volunteer support and participation

Volunteer support is the foundation of many successful environmental programs. This approach accepts volunteers who pay to participate in research projects.

The example has broad application to research and conservation programs in environmental management and heritage resources.

Animal behaviour, resource management, water quality, ecology, conservation, rain forests, anthropology, archaeology, marine science (a range of natural and social sciences) are addressed in this approach to incorporating volunteer participation. One example is at Lake Naivasha, Kenya's second largest freshwater lake which together with its outflow gorge (Hells Gate) are important biodiversity sites. This was recognized by the 1984 declaration of Hells Gate as a National Park, one of Kenya's newest and smallest, and by the 1995 declaration of the lake as a RAMSAR wetland site of international importance. The area has national value for fisheries, agricultural irrigation, wildlife conservation, and tourism. For the last two decades it had experienced pressure from natural water level fluctuations, alien species introductions and disappearance of marginal swamps. Hells Gate is under pressure from both tourism and the development of a geothermal power station.

Volunteers work in teams of 3-4 under the direction of one scientist and execute such tasks as collecting samples, operating environmental recording equipment, examining and measuring specimens, carrying out chemical analyses, data processing, and observing bird distribution and behaviour. Three four-day work periods enable volunteers to participate in three different projects, and evening lectures plus natural history videos build up a complete picture of both the project and the unique Rift Valley- the cradle of mankind- in which it is located. applicable. Volunteers have the opportunity to experience different national parks such as Lake Nakuru, which contains the world's greatest flamingo concentration, and the Masai Mara, a spectacular location for savannah game. The information and assistance from this study contributed to the recent adoption of a voluntary 50 m buffer zone of uncleared vegetation at the lake edge which accounts for approximately 80% of the shoreline. The other important result of the project was the declaration of Naivasha as a RAMSAR site, a wetland of international importance, in April 1995, only the second such site in Kenya and perhaps one of the most significant in East Africa.

The primary source of funding for this project is the non profit organization Earthwatch, which uses paying volunteers to assist in the project's field work. Over \$50,000 is expected to be given to the project during the 1997 financial year. The volunteer contribution approach discussed here is used by this organization to augment work in number of field projects. Volunteers contribute time and effort; and their monetary contributions also aid in the maintaining the organization's operations.

Case study submitted by: Earthwatch

For more information contact: Charlotte Hanley, The Centre for Field Research, Earthwatch, 680 Mt. Auburn St., Box 9104, Watertown, MA 02272, U.S.A. Telephone 617-926-8200 or 1-800-776-1088 cfr@earthwatch.org

Case Study B4: Waterfowl, hunting, and habitat stamps

The use of required stamps for hunting or fishing licenses combines may be considered either a user fee or surcharge. The stamps target resource users and allow for the allocation of money directly to conservation efforts. There is potential for the application of this approach to other recreational resources.

Many American states require the purchase of waterfowl stamps as part of obtaining a hunting, fishing, or trapping license. Stamp prices range in price from US\$2.50 to \$7.50 with variation from state to state and residency. The stamps generate revenue for the purchase, conservation, and enhancement of habitat.

In Iowa the cost of a stamp is \$5.00 per hunting license. The money raised is transferred to a Fish and Wildlife Trust fund which is then used by the Prairie Joint Venture (a partnership of the Iowa Department of Natural Resources, the U.S. Fish and Wildlife Service, county conservation boards, and non profit organizations) to purchase wetlands and restore privately held wetlands for wildlife. Oddly, lands purchased through stamp revenue are subject to state taxes, but the state reimburses local governments for lost taxes with stamp revenue, though the state is not required to do so. This complex and seemingly contradictory tax arrangement would be negated in many other jurisdictions where the tax regimes provide benefits, or exemptions, for lands owned by trusts or similar public bodies.

Michigan has instituted a Duck Stamp Program, and Nebraska has created a Habitat Stamp which at \$7.50 each provides about \$1.1 million in revenue per *annum*. In Nebraska over 19,000 acres of land have been purchased with stamp revenue, including about 3,350 acres of wetlands. In New Jersey the Waterfowl Stamp and Print Issue, \$2.50 for residents \$5.00 for non residents, raises about \$215,000 per *annum* and over 6,000 acres have been purchased since 1984.

Case study submitted by: Maryland Department of Natural Resources.

Reference: MDNR, 1995, *Report of the Governor's Blue Ribbon Panel, financing alternatives for Maryland's tributary strategies*, MDNR, Anapolis Case originally cited by Apogee Research, 1990.

For more information contact: Iowa Department of Natural Resources, Wallace State Building, Des Moines, IA, 50319-0034, U.S.A. Other relevant state natural resource department or wildlife conservation agencies.

Case Study B5: Mine reclamation and land treatment; using municipal sewage, Nevada

The reclamation of mining sites, and disposal of sewage have been combined in the case study. Funding and technical support is provided through government, private, and university cooperation. The approach is integrated and innovative not only in the partnership funding but also in the environmental objectives.

Municipal sewage disposal, mine reclamation, arid land re-vegetation are issues dealt with in this project. The Butcher Boy Mine demonstration project utilized sewage sludge (biosolids) from the Reno-Sparks metropolitan area to enhance mine reclamation efforts. The study site is located in the western Great Basin on a gently sloping alluvial fan receiving an average annual precipitation of 150 to 200mm. Mine tailings at the site are *cobbly* and deficient in organic matter and soil micro flora. In November 1992 partially treated sewage was applied to test plots and worked into the soil with bulldozers and harrows. Plots were seeded with several grass and *forb* species. Initial results from test plots indicate that biosolids application has hastened re-vegetation and improved soil texture. No adverse effects have been noted.

The project evolved from a collaboration between the U.S. Bureau of Land Management and the Harry Reid Centre for Environmental Studies at the University of Nevada-Las Vegas. Planning efforts included permitting a one-time application of biosolids, as well as arranging long-term monitoring of vegetation, soil conditions, and groundwater quality. The mine operator, American Resources Corporation, completed preparatory earth-moving and provided a front-end loader. Empire Farms, the sludge disposal contractor for Truckee Meadows Water Reclamation Facility, was able to provide the sludge at no cost since the project site was located closer to the treatment plant than its usual disposal site.

Empire Farms donated use of its tractor and a biosolids spreader (with operator) to apply the biosolids on the test plots. Seeding equipment and technical expertise were provided by the Harry Reid Centre for Environmental Studies and the USBLM, which continues to monitor the site. All of the participants benefited from the project, and expenditures were kept to a minimum. Partnerships between government, industry, and a university resulted in shared costs and shared benefits.

Case study submitted by: U.S. Bureau of Land Management

For more information contact: Craig McCaa U.S. Bureau of Land Management Northern District Office, 1150 University Avenue, Fairbanks, AK 99709 Telephone 907- 474-2376, E-mail: cmccaa@ak.blm.gov.

Dave Loomis or James DeLaureal, U.S. Bureau of Land Management, Carson City District Office, 1535 Hot Springs Road, Carson City, NV 89706, Telephone 702-885-6000,

Dennis Trexler, Division of Earth Sciences, Harry Reid Centre for Environmental Studies, University of Nevada-Las Vegas, 100 Washington Street, Suite 201, Reno, NV 89503, USA

Case Study B6: Rehabilitation of pits and quarries, Ontario

Stone quarries can create costly rehabilitation problems. Ontario has implemented a user financed system to fund cleanup work. The levy (surcharge) is managed by industry in a trust format. The case study demonstrates the potential returns for land reclamation from the use of dedicated revenue from production levies. Savings may be realized by developing a trustee arrangement with industry for program implementation. This option may also incorporate a compliance bond approach.

The Abandoned Pits and Quarries Rehabilitation Fund is provided through Ontario's Aggregate Resources Act and was amended by Bill 52 (passed Dec. 19, 1996 and expected to be proclaimed in the spring of 1997). Current pit and quarry operators pay an annual production levy of which 0.5% per tonne accrues to the fund. This results in average returns of more than CDN\$500,000 per year. Initially responsibility for delivery of the program rested with the provincial government, but this will pass from the Ministry of Natural Resources to a trustee. The trustee in turn is expected to develop a contract with an industry association, the Aggregate Producers Association of Ontario, to deliver the objectives of the program. At this time approximately 60 individual projects have been completed.

This approach to quarry rehabilitation combines elements of a surcharge and compliance bond. A non government trust is employed to manage funds that will be used for site rededication. This example typifies the current policy approach in Ontario that encourages private/government partnerships in environment and resource management, and a stewardship approach that is increasingly based on non government management.

Case study submitted by: Ontario Ministry of Natural Resources.

For more information contact: Brian Messerschmidt, Ministry of Natural Resources, Peterborough, Ontario, Canada, Telephone 705-755-1949

Case Study B7: Financing environmental trusts; support from a state lottery, Nebraska

Nebraska's State Lottery demonstrates the significant potential for using this relatively common public offering to finance environmental works. A broad range of environmental activities can be supported from lottery funds. In some jurisdictions the revenue realized would be quite significant.

The Nebraska state lottery was established in 1993. Since its creation about US\$65 million in revenue has been collected. These funds are assigned by legislation to educational and environmental projects within the state. State law governs distribution which sees 25% of revenue allocated to the Solid Waste Landfill Closure Assistance Fund and 24.5% to the Solid Waste Landfill Closure Assistance Fund. Since 1993 \$15,985,844 has been transferred to the Solid Waste Landfill Closure Assistance Fund, and \$16,312,086 to the Solid Waste Landfill Closure Assistance Fund.

The Environmental Trust is supported by funds from the State of Nebraska Lottery. This support is available to the Environmental Trust so that it can make grants for recycling projects, forestry, air quality, water quality, sediment remediation, wetlands preservation, and projects initiated by public agencies, private organizations or interested individuals. One example is a the tire recycling project in the state redirects used automobile tires to other uses rather than deposition in landfills. Tire recycling is a costly venture that often requires some form of public funding support. The entire program is financed from the proceeds of Nebraska's State Lottery.

Case Study submitted by: Nebraska Natural Resources Commission

For more information contact: Steve Gaul, Nebraska Natural Resources Commission P.O. Box 94876, Lincoln, NE, 68509, U.S.A. Telephone. 402-471-2081

Nebraska Environmental Trust P.O. Box 30370, Lincoln NE, U.S.A. 68503-0370, Telephone 402-471-5409.

Department of Environmental Quality, P.O. Box 98922, Lincoln NE, U.S.A. 68509-8922, Telephone 402-471-2186.

Nebraska Lottery, P.O. Box 98901, Lincoln, NE, U.S.A. 68509-8901, Telephone, 402-471-6100.

Case Study B8: Saskatchewan soil enhancement project

The project achieves its objective by providing education, extension and technical support to farmers to help them successfully adopt new low disturbance farming systems. Funding is provided by a joint public private partnership linked to agriculture.

This project deals with issues in soil erosion; soil organic matter loss; CO₂ sequestration, and describes the Saskatchewan Soil Enhancement Project sponsored by the Saskatchewan Soil Conservation Association. The objective of this project is to increase the adoption of low disturbance seeding systems (zero tillage) in Saskatchewan. Low disturbance seeding systems have been shown to be the most effective erosion control methods. Research has also found these systems to be an effective method to increase soil organic matter levels and consequently soil carbon.

The project achieves its objective by providing education, extension and technical support to farmers to help them successfully adopt the new farming system. Methods used in the project include demonstrations, focus group meetings, information meetings, conferences, field tours, newsletters, news releases and a toll-free information line. The program is delivered by eight agrologists who work under contract to the project.

The area seeded using these techniques increased from 4 million in 1994 to 8 million acres in 1996 and is expected to increase to 10 million by the end of 1997. (note: there are 34 M acres seeded in Sask. every year). Fifty percent of the funding came from the Canada-Saskatchewan Agriculture Green Plan Agreement. 25% came from TransAlta Corporation (private electrical utility based in Alberta) and 25% from Monsanto Canada. Total amount raised was \$1.6 million over a 3 year period. Half of the funding has been provided by private sources.

Case study submitted by: Saskatchewan Soil Conservation Association

For more information contact: Saskatchewan Soil Conservation Association, Doug McKell, Executive Manager, Box 1360, Indian Head, SK, Canada, S0G 2K0 Telephone, 306-695-4233; Fax: 306-695-423, E-mail: ssca@sk.sympatico.ca,

Case Study B9: Financing forest management with a surtax on resource royalties, British Columbia

The application of a surtax to existing resource royalties has provided significant revenue in this case study. New revenues have been applied to a range of environmental and social programs within the forestry sector. The surtax is relatively modest but has made a significant contribution to forest management in British Columbia. This is an option that has broad application in many jurisdictions regardless of level of industrial or economic development.

In a nation that has one the world's largest forest industries the western province of British Columbia stands out as a jurisdiction where the forest industry is of overwhelming economic importance. It is also a region where the industry has been subject to increasing conflict over management practices in recent years. In 1994 the provincial government announced the creation of a Forest Renewal Plan (FRP), which was to be implemented and managed by a government owned corporation established just for the purpose (Forest Renewal B.C.).

The objective of the renewal plan was to invest in forest renewal and activities related to the sector. Financing the plan would be achieved through an increase in the stumpage rate, the royalty charged to companies for access to publically owned timber. Since about 95% of British Columbia's forests are owned by government this meant that considerable revenue could be realized. The objectives of the plan can be grouped into improved forest management and enhancing resource value. The first objective involves renewal programs centred on improving tending and reforestation, increasing the forest land base, and investments in silviculture research; environmental restoration and protection centred on remediation, habitat protection, and forest practice research; and policy development aimed at new approaches to stewardship. The second objective centres on encouraging the expansion of value added industries, investment in worker training, improving aboriginal participation in the forest economy, aiding community development initiatives, and other policy changes.

Some of the objectives of the FRP have been components of government policy for some time. What is new is the way that the objectives are financed, and the coordinated and relatively strategic way that the plan is being implemented.

Financing relies on an increase in the stumpage rates (royalties) charged to industry for timber from public lands. The increase may be termed a surtax. The surtax varies with factors that affect the industry. Annual revenue for the FRP depends on harvest levels, commodity prices, and the Canada/U.S. currency exchange rate that prevails throughout the year. The revenue collection system developed to fund the FRP was

designed to insure that industry will not have to pay incremental rates when it can least afford to. When lumber prices are low the FRP's revenue may in fact drop to zero. Revenue is based on the factors that affect industry's viability. This was done so that the sector would not be disadvantaged in difficult years. Stumpage revenues vary with volume harvested. On a total harvest of 60 million cubic metres a change of 1 million cubic metres would affect revenue by CDN\$7.25 million. The Canada/U.S. exchange rate will affect the selling price of lumber which in turn will affect the stumpage rate. Current estimates of revenue are based on a rate of \$0.73 CDN/U.S. a change to \$0.74 would affect revenue by \$5.5 million, a decrease to \$0.72 would increase revenue by \$5.3 million. Revenue will vary significantly with lumber prices, an increase in prices of \$10 per thousand board feet from a projected \$285 per thousand board feet would increase revenue to the FRP by \$11 million.

For 1996/1997 the predicted revenues for the FRP is \$477 million. The estimates are based on a lumber price of \$285 per thousand board feet for spruce/pine/fir 2x4 #2 grade, and \$800 for hemlock small squares. This will generate an estimated \$422 million from stumpage, the balance of \$13 million would come from waste timber fees. The projection assumes a harvest of 60 million cubic metres. Not all of the fund's revenues are treated as expenditures. In the most recent fiscal year about \$294 million will be spent, and \$183 million will be used for program expansion.

By law, the provincial treasury acts as the FRP's fiscal agent and is responsible for investing residual funds. Because of the uncertainty of both future income and future expenditures a relatively conservative investment philosophy has been adopted. The asset mix is 70% money markets, 20% short term bonds, and 10% equities. The objectives of the asset mix were based on capital preservation rather than income maximization, assured liquidity to cover annual program expenditures, and maximizing the returns on investment within a conservative risk context. As of March 1996 the balance invested through the provincial treasury was \$613 million, an amount that will likely increase during the most recent fiscal year. The surplus may be drawn down in future years due to periodic declines in revenue and growing program expenditures. There is considerable potential for volatility in the FRP's revenues. Low timber prices, fluctuations in the exchange rate, or reduced harvests would affect revenue. The program continuity fund allows the program to continue funding its activities in years of revenue decline.

Over the long term the program expects to spend about \$400 million annually. The approximate distribution of funds is; land and resources 50%, environment 15%, workforce 20%, communities 7.5%, and value added 7.5%. The distribution is flexible, and in recent years the allocation of revenue has been quite variable.

Case study submitted by: Forest Renewal British Columbia

For more information contact: Andrew Little, Forest Renewal B.C., 9th floor, 727 Fisgard Street, Victoria, B.C., Canada, V8V 1X4, Telephone 250-387-2500, or in Canada 1-800-663-7867, email info@hq.frbc.gov.bc.ca

Case Study B10: Nebraska natural resource districts

Natural resource districts were formed to deal with soil, water, and habitat conservation. Funding for their work is derived from a combination of revenue bonds, property tax assessments, and special levies. The integration of a range of revenue tools provides flexibility and relative consistency for the agencies.

The state of Nebraska has 23 multi jurisdictional natural resource districts (NRD) which manage soil and water conservation, wildlife habitat, and other resource protection activities. They were established by the state legislature in 1969 in response to the issue of overlapping boundaries and responsibilities for water resources. Their boundaries follow the state natural river basins.

In order to implement natural resource protection programs NRDs have the authority to levy local property taxes (previously collected by counties or local soil and water conservation districts) and to administer funds from other local, state, and federal sources. For projects that have a particular benefit to a specific area NRDs can also levy special assessments to businesses and individuals within an area. An NRD may issue revenue bonds, but not general obligation bonds. But revenue bonds have a very limited applicability to environmental projects. The average property tax rate is \$0.32 per \$1.00 of actual valuation. NRD budgets range from US\$323,000 to \$11.7 million, although 17 NRDs have budgets less than \$1.9 million, which is the mean. Property tax revenues provide between 28% and 60% of an NRD's total budget, the remainder comes from federal, state and local funds, and special assessments.

Spending is primarily dedicated to water, soil, habitat, and tree planting. NRDs monitor and manage surface and groundwater resources by testing agricultural irrigation systems and all wells for contamination. They also build and operate flood control structures, enforce clean up requirements, and where necessary they may also establish special protection areas for water quality. They administer federal, state, and local funds for erosion and sediment control practices and structures; primarily for agriculture. They also help develop local soil management plans. In conjunction with the Nebraska Game and Parks Commission they administer the Wildlife Habitat Improvement Program for the acquisition, leasing, and enhancement of habitat. The state pays 75% of these costs, from habitat stamp sales, NRDs cover the remaining

25%. NRDs also cover the cost of tree planting programs which concentrate on private property owners for voluntary participation.

Each NRD has a board of directors, elected locally, who serve as the governing body. There is an overall association of resource districts that provides some administrative support for programs and operations, and represents the districts at the state and federal levels of policy making.

Case study submitted by: Maryland Department of Natural Resources.

MDNR, 1995, *Report of the Governor's Blue Ribbon Panel, financing alternatives for Maryland's tributary strategies*, MDNR, Annapolis, Case originally cited by Apogee Research.

For more information contact: Nebraska Natural Resources Commission, P.O. Box 94876, Lincoln NE, U.S.A. 68509, U.S.A.

Case Study B11: A conservation credit system, Wisconsin

A program of tax credit incentives was implemented to encourage land use practices that may aid in habitat conservation and improved water quality.

The conservation credit approach to improved water quality encourages the commitment of local, state, and federal agencies to an equitable partnership, thereby reducing federal and state funding for conservation incentive programs. The objective of this approach is to change farm practice behaviour. Originally, the Resource Conservation Act sponsored Conservation Credit Project (1984-1991) dealt only with crop land soil erosion on individual farms and did not address nutrient management, rural well contamination, wetland protection, and watershed protection. In an effort to address these issues a revised proposal was put forth that included tax credit incentives of \$2.00 per acre for crop land protection, \$4.00 per acre for nutrient management, \$2.00 per acre for perennial stream bank management, \$1.00 per acre for upland intermittent stream management, a \$0.25 per acre bonus when 75% of a watershed is protected, and an additional \$0.24 per acre when 85% is protected. A potential \$9.50 per acre property tax credit is possible.

Case study submitted by: Maryland Department of Natural Resources.

MDNR, 1995, *Report of the Governor's Blue Ribbon Panel, financing alternatives for Maryland's tributary strategies*, MDNR, Anapolis, Case originally cited by Apogee Research.

For more information contact: Pepin County Land conservation Department, 740, 7th Avenue W, P.O. Box 39, Duran, WI, U.S.A. 54735, Telephone 715-672-8665.

Case Study B12: Mitigation banking: purchasing and transferring development rights

Mitigation banks may offer a cost efficient alternative to regulation coupled with compensation or subsidies. The approach can also encourage a more regional view of pollution or other environmentally destructive activities.

A transfer development rights (TDR) or purchase development rights (PDR) bank can be developed and funded with agricultural transfer tax revenue, general obligation bonds, and local government contributions. Such banks can be formed by state or local government partnerships, a non profit entity, or a combination of these. In any jurisdiction that has a program for the transfer of development rights the bank could purchase the development rights for agricultural land, private forests, wetlands, or other desired habitat. The bank may then extinguish the rights, or sell them as TDRs to developers to raise funds for the purchase of other rights.

New Jersey created a state wide TDR bank in 1987, and funded it with an initial US\$20 million grant. The New Jersey Pinelands Development Credit Bank has been created for a specific region within the state. Three TDRs exist in California, in San Luis Obispo, Monterey County, and Morgan Hill. Montgomery County in Maryland has also set up a TDR bank. A variation of this theme are the wetlands mitigation banks described in Case Study B13.

Case study submitted by: Maryland Department of Natural Resources.

Reference: MDNR, 1995, *Report of the Governor's Blue Ribbon Panel, financing alternatives for Maryland's tributary strategies*, MDNR, Anapolis.

Putting transfer of development rights to work in California, 1993, by R. Pruetz, Solano.

Planning for transfer of development rights: a handbook for New Jersey municipalities, 1992, by A. Gottsegen and C. Gallagher, Burlington County of Chosen Freeholders, Mt Holly, NJ.

Case Study B13: Wetland mitigation banking in the U.S.

The development of mitigation banks has been well explored in the context of compensation for wetland loss. The American experience is particularly well developed in comparison to other regimes. The approach is innovative in that it combines both a regulatory and economic approaches to ecological compensation. The cost to public agencies is, in most instances, minor when compared to the potential costs of providing publically funded restoration, enhancement, or subsidies for remediation. Industry benefits by being able to provide compensation for development without the loss of rights or the undue burden of costly regulation. The case study is derived directly from USACE Report IWR-WMB-1 by Reppert (1992).

The objective of wetland mitigation banking is to replace the physical and biological functions and other use values which are lost when wetlands are lost to development. Wetland mitigation banks are usually large blocks of wetland whose estimated tangible and intangible values, termed credits, are similar to cash deposits in a bank account. As anticipated development takes place, credits equivalent to the estimated wetland losses are withdrawn or debited from the bank to compensate for losses incurred. As development continues the credits of the bank, which are qualitatively similar and scaled in size to the magnitude of anticipated loss, are progressively exhausted. Eventually the credits will be reduced to zero and other means or banks have to be developed. Mitigation can be achieved through the creation, restoration, enhancement or preservation of other wetland areas of equivalent value, usually located outside the area of loss.

The estimation of wetland loss, debits, and credits contained within a bank are determined using analytical and non analytical methods. Analytical methods are functionally based and vary in their degree of comprehensiveness. The more comprehensive valuation of wetlands necessitates the use of methods capable of quantifying a broad array of physical and ecological functions that wetlands provide. The method most commonly used for valuation and accounting is a non-analytical one which merely tabulates credits and debits according to the area (acreage) of various wetland types. Using this method compensatory mitigation is effected merely by replacing wetlands lost with wetland types contained in a bank on an area basis.

Sponsorship of wetland mitigation banks varies from industrial firms, individuals, public agencies, or non profit organizations. They usually fit into one of two categories; dedicated banks whose objectives are compensation for losses from discrete types of construction activity, usually sponsored by single entities; and commercial banks established by private entrepreneurs who provide credits on an

open market. In the U.S. context the types of banks that have been established include industrial banks, highway related banks, port related banks, federal project banks, commercial banks and the sale and purchase of credits, and wetland mitigation trusts

Generally the advantages of the approach include the consolidation of small wetland losses, mitigation in advance of development, an increased planning effort that may result in more ecologically sensitive planning, higher environmental and social value largely due to the relatively large size of most banks, reduced conflict over development, better monitoring and evaluation, improved regulatory climate, high levels of public support, relative economic efficiency, and the advantage of permanence. The potential weakness of wetland mitigation banking might include uncertainty about wetland management techniques, incomplete mitigation or necessity for compensation using wetlands not like those lost, the primitive nature of crediting and debiting techniques, and the potential for administrative and financial conflict between managing agencies or credit users.

In the U.S. at present there are over 100 existing, or under implementation, wetland mitigation banks. Most are located in California, the Pacific Northwest, the South, and the Atlantic Coast. The majority have been established to compensate for losses to highway construction. Industrial banks account for some of the earliest cases. For example, Tenneco LaTerre sponsored a bank to help mitigate, in advance, wetland losses due to its oil and gas exploration along the Louisiana coast marshes. The holdings were eventually purchased by another firm and the bank is now entirely proprietary in nature, in other words it is located on company lands with the continued implementation of restoration measures and operation by a private firm. The approach may provide a more strategic, comprehensive, and long term approach to mitigation than simple no net loss regulations.

Information provided by: Environment Canada and the U.S. Army Corps of Engineers.

Reference: Reppert, R. 1992, *National wetland mitigation banking study; wetlands mitigation banking concepts*, IWR Report 92-WMB-1, USACE, Virginia. Other reports from this series are now available

For more information contact: U.S. Army Corps of Engineers, Institute for Water Resources, Alexandria VA, U.S.A. 22315. Further IWR reports on wetland mitigation banking can be obtained from <http://www.wrc-ndc.usace.army.mil/iwr/currpt.htm> which requires adobe acrobat.

Case Study B14: Conservation easements, examples from Ontario

The development of land trusts provides an alternative to public financing of land conservation. Significant savings to governments may be realized through the encouragement of trust support for easements, land donations, or other arrangements.

Presently land trusts in Canada are not as extensive in area or level of organization as in the U.S. and Great Britain. But even though the land trust movement is not as developed, there has been a rise in activity in Ontario. The Federation of Ontario Naturalists has purchased about 14 properties that range from a portion of Pelee Island (a significant bird habitat area) to bogland in Muskoka. Local naturalists clubs have also purchased lands, historic societies hold individual buildings; the Rose Trust and the Preservation of Agricultural Lands Society have worked to establish a Foodland Trust and protect portions of the Niagara fruit belt; and organizations such as the Natural Heritage League, Ontario Heritage Foundation, Nature Conservancy of Canada, and Wildlife Habitat Canada have encouraged and advanced the land trust movement.

In Ontario the emergent movement toward the establishment of trusts has focussed on sites that are primarily small in area, and most trusts are locally based. They have also been haphazard in the sense that they must often take advantage of land that can be purchased with limited resources. This can result in the preservation a patchwork of sites rather than a more ecologically rational continuum of wilderness, countryside, shoreline, or wetland. Nevertheless, trusts have helped preserve some small segments of much diminished ecosystems. The Ontario legal and tax context supports the use of conservation easements or covenants, land donations to government or non profit organizations, management agreements, and land leases.

Two examples in Ontario illustrate the potential for employing easements to protect sensitive lands. In the St Lawrence River Stave Island has been protected by a conservation easement held by the OHF (the easement was donated). The island contains several wetlands and is adjacent to St Lawrence Islands National Park. Parks Canada monitors the island under the provisions of a formal arrangement. This is an example of a cost effective way of preserving sensitive lands adjacent to an established reserve. Though there is federal participation in the Stave Island easement, through a monitoring and management role, the cost contribution is certainly low in comparison to the overall ecological benefits that the adjacent park receives by increasing the area of biological diversity.

Rockbridge Farm, in Bruce County, is located on the Niagara Escarpment and provides another example of the use of a conservation easement to protect a site of natural heritage significance. The escarpment is a ridge that stretches from Lake Huron to the Niagara river, and contains remnant forest communities that are viewed as being essential to biodiversity conservation in Ontario. The owners of this property received a tax receipt for their easement contribution. The Niagara Escarpment Commission viewed this land as complimentary to the long term environmental objectives of its conservation planning. The owners wanted to prevent future severances and commercial logging, but they also wanted to be able to live on the land. The use of a conservation easement provided the Commission with the opportunity to compliment its planning objectives, specifically its rural designation component, with little expense. The property owners also received a tax benefit, and retained the right live on the property without concern about the impacts of future development. As a result of this easement arrangement an area of mixed woodland and field has been preserved, and a segment of the escarpment's fragile ecosystem has been protected from development.

The Federation of Ontario Naturalists (FON) provides an example of a conservation group that has developed a land trust. The FON has purchased nature reserves over the past 30 years. Some of these purchases have been made with assistance from the Nature Conservancy. In some instances there is an ongoing need for funds to provide conservation management and upkeep. The FON has established a Nature Reserves committee to oversee management issues on its trust lands. At present the FON has purchased properties on the Bruce Peninsula and near Point Pelee that compliment existing federal parks, and protects land in areas subject to significant development pressure. Both these regions are integral to the greater Great Lakes ecosystem and may well serve as a model for future expansion of non government reserves. For governments there are opportunities to contribute expertise in developing conservation plans, the provision of grants to aid in the operation and maintenance of such lands, and help in identifying sensitive areas that may be appended to trusts by purchase, easement, or donation.

The cost to government is minimal, and indirect, and the landowner's objectives to have continued access and preservation have been accommodated. In this example land use conservation has been implemented by employing an approach that is voluntary and compensated, and imposes no direct cost onto federal agencies. The cost is indirect because taxes are forgone, no direct payment has been provided. The value may be measured by assessing the cost to government for land purchase as opposed to granting an easement.

Case study submitted by: Academic source

References: Hilts, S. and R. Reid, 1993. *Creative conservation, Ontario land trusts*, Federation of Ontario Naturalists, Don Mills.

Case Study B15: Global Environment Facility support for conservation trusts

The Global Environment Facility (GEF) provides support for the development of conservation trust funds. This support is often developed and implemented in partnership with other organizations. The objective of the GEF approach is to provide a source of stable long term financing for recurrent costs associated with maintaining conservation areas. Preserving biodiversity is the primary policy objective. This case study illustrates the potential for supporting long term conservation objectives through capital investments placed in a trust fund where the income generated supports specific projects. The description of GEF trust fund arrangements was adapted from the discussion paper by Mikitin (1995). (See Case Study B1 for a description of automated park fee collection that has applicability to some GEF initiatives).

The Global Environment Facility (GEF) was established in 1990 as a three year US\$1 billion pilot project to assist environmental activities in the developing world. One of the objectives of the GEF is to address biodiversity loss through conservation initiatives. The terms of reference for the GEF were amended in 1992 so that it could serve as an interim financing mechanism for the biological diversity conventions (beginning with *Rio 1992*). After difficult multilateral negotiations in 1994 the GEF was converted to a permanent facility. The GEF receives multilateral support and is associated with the program and policy objectives of the World Bank, UNEP, UNCED, and UNDP. The GEF is also implemented through these agencies. The facility provides grants, not loans, basically because its activities do not generate direct economic gain or benefits. The grants compensate developing countries for projects that may be costly to them but provide greater cumulative (global) environmental benefits.

The GEF has provided support for the establishment of conservation trusts. Such trusts have the potential advantage of providing relative stability in times of fiscal restraint. Biodiversity conservation is an emergent policy objective in the developing world, and as such it has not generally benefited from long-term investment support or reliable revenue flows that support other institutions. Though there has been an increase in institutional support for conservation efforts in the developing world there are few resources available for recurrent costs. Sources of support for operations, maintenance, and infrastructure are often uncertain. This is largely a function of 4 factors; inadequate government resources for recurring costs, few donors can support

operating costs over the long term, revenue generating mechanisms have yet to be developed, and revenue from ecotourism or other commercial activities may fall into a general budget (the general revenue trap, see also Case Study B16).

The primary objective of GEF trust funds for biodiversity conservation is to provide long term financing for the recurrent costs associated with protected areas or to encourage the sustainable use of natural resources through community support. But GEF trusts may also have other advantages; such as supporting a range of different activities, being able to adapt to the absorptive capacity of the receiving nation, expanding participation and capacity building, and providing an attractive alternative for co-financing by other donors. Such trusts are based on the initial investment of assets provided by GEF grants and other donors. The income realized supports activities outlined in the agreement establishing the trust. The assets are intended not only to support immediate needs through income, but also to appreciate and grow in perpetuity. Some examples of GEF supported trust funds are provided below.

The Foundation for Eastern Carpathian Biodiversity Conservation is being established to fund joint cross boundary ecosystem management and protection. It will also support research and monitoring. The initial size of the fund is \$600,000 with a growth objective that has yet to be specified. The GEF has provided two initial contributions of \$300,000. The MacArthur foundation has financed assistance from the WWF for trust design and provided the second initial contribution. No part of the trust's initial capital may be withdrawn to fund activities, and a maximum of 15% of the income may be used for administration. The foundation will be established in Switzerland with a Swiss citizen on the board as required by Swiss law, the remaining board members will be from NGOs and each country covered by the project area.

The Bolivian Biodiversity Project is supported by a trust that will finance recurrent costs realized in managing priority protected areas belonging to the National System of Protected Areas. It will also help support related programs. The initial size of the trust is \$1 million with a growth objective of \$35 million by 1997. The GEF provided \$40,000 for project preparation costs, and Swiss Development Cooperation provided \$1 million for the initial investment. Morgan Guarantee is a co-trustee and asset manager.

The Bhutan Trust Fund for Environmental Conservation assists the government of Bhutan in conserving forests and preserving their biological diversity. The income generated during the first five years supports the establishment and management of a national system of protected areas, and the development of institutional capacity and resources to manage the system. The initial size of the trust was \$9.5 million, with a growth objective of \$20 million. Donors were GEF (\$7 million) WWF US

(\$1 million) Norway (\$586,725), and the Netherlands (\$948,163). The GEF will contribute an additional \$3 million when objectives in institutional reform are met relating to the protected areas system. The trust was formed under the UNDP which confers tax free status, the UNDP also invests the funds. Board membership includes UNDP, the Bhutan Government, and the WWF US.

Information provided by: The World Bank

Reference: Mikitin, K, 1995, *Issues and options in the design of GEF supported trust funds for biodiversity conservation*, World Bank, ESD Paper 011, Washington DC. *This reference provides a substantial review of issues surrounding the implementation and structure of trust funds in an international context.*

For more information contact: The World Bank, Environment Department, Global Environment Facility, Re: GEF Trust Funds, 1818 H Street NW, Washington DC, U.S.A. 20433. Telephone 202-473-3641.

Case Study B16: Full revenue retention: avoiding the general revenue trap, recent policy in Ontario

This brief example highlights the North American trend toward user fees and dedicated funds. By allowing conservation agencies to retain the revenue generated from their programs funds can be directly allocated back to the environmental resources that provide them. The general revenue trap is avoided. This refers to situations where funds received from resource use are lost to the budgetary process and may not be reallocated to conservation, protection, or enhancement. The Ontario example is innovative because it marks significant change in public policy for that jurisdiction and may provide an example for other regimes. Ontario has also instituted a significant program of privatization for public services and government corporations. The extent of savings and revenue generation is yet to be determined.

An example of addressing the general revenue trap is provided by recent policy decisions in the province of Ontario. Ontario parks are being restructured to act as business like entities with the right to full revenue retention. The funds that the province's parks system collects from user fees are retained by the parks for maintenance, operations and expansion costs. Provincial fish and wildlife policy is being restructured to emphasize shared responsibility. This implies that opportunities will be developed for having business or special interest groups provide services or products presently afforded by the province. Funds received from permits and licences within fish and wildlife work will also be dedicated to those functions.

Special purpose accounts will hold revenue and provide the monies used for provincial fish and wildlife conservation efforts.

Ontario has also moved to change the way that forest fire protection, silviculture, and forest information systems are funded. Industry will support forest management activities long funded by government from general revenue. Self monitoring and self evaluation supported periodic audits will be employed to insure that the province's program of self compliance is being followed by the forest industry. The approach will rely to a great extent on the adoption of standards by the forest industry. This marks a significant change in the way that forest resource policy is implemented and funded in Ontario. The costs for these activities will assume a user fee character as they are shifted directly onto the forest industry. Implementing a policy of full revenue retention provides a method for allocating revenue directly to forest management and environmental work. Overall cost to government will decrease, but the impact on industry may be highly variable.

Case Study submitted by: Academic source

For more information contact: Deputy Minister, Ontario Ministry of Natural Resources, Macdonald Block, Bay Street, Toronto, Ontario, M7A 2C1.

Case Study B17: Eliminating perverse incentives, North American examples

These examples highlight several large scale approaches to the elimination of perverse incentives, and one jurisdiction where the incentives are still working against conservation efforts. The applicability of these policies to other jurisdictions is variable, but they illustrate the working application of the concept.

Rather than encouraging compliance with good conservation practice some Canadian federal legislation actually encourages the destruction of habitat. The Income Tax Act provides for a tax deduction for landowners who clear, level, or drain land for business purposes. Farmers who remove habitat for farming purpose may receive a deduction for the amount spent in the respective tax year. This is an issue that also relates to program contradiction. This form of contradiction of conservation objectives can be addressed by having such sections negated in instances where their use is contrary to the achievements of environmental policy objectives. Other examples of Canadian federal legislation that support habitat destruction are the Canadian Wheat Board Act and the Western Grain Stabilization Act. These acts contain provisions that directly encourage the destruction of habitat. American tax law no longer allows deductions for expenses incurred in farming wetlands.

In contrast to the above in the United States the *Farm Bill* provides an illustration of the direct opposite of perverse incentive. The bill establishes voluntary and compensated compliance programs to encourage wetland conservation and implement soil erosion controls. The Conservation Reserve Program (CRP) component of the U.S. Farm Bill has been extended at its present size (funding levels have not been increased, but new enrolments are permitted). The CRP is a rather innovative approach to conservation compliance of farmlands. It relies on voluntary and compensated participation to achieve its objectives. The provisions of this legislation are not enforced by strict regulation but are instead encouraged by voluntary participation. In exchange farmers are compensated for taking land out of production or for forgoing the benefits they would gain from converting wetlands to cropland.

The U.S. now denies all federal subsidies, including price support and crop insurance, to farmers who cultivate drained wetlands or highly erodible cropland. In Canada the structure of subsidy and support programs in agriculture is different, and the political and administrative context has relied more on regulation than incentive. However support programs do exist here; in the form of both direct and indirect payments, and through complex support systems such as supply management for some sectors (the dairy industry for example). Therefore it is possible to create a form of cross compliance by linking support programs to conservation compliance; though the administrative and political feasibility aspect of putting this into practice would be challenging. For example, access to an expanded quota for dairy production (or other products subject to supply management) could be linked to the implementation of desired conservation measures such as conservation tillage, construction of retention tanks for animal waste, fencing off streams from grazing areas, reducing pesticide or fertilizer use, and preserving wetlands and woodlands.

The U.S. Coastal Barrier Resources Act provides another example of addressing perverse incentives and reducing program contradictions. This act was created to reduce federal activities that support the development of relatively untouched portions of the barrier islands. The act is designed to reduce threats to property and people, to minimize public expenditures on managing flooding, and to reduce damage to fish wildlife, and other sensitive environmental resources. This act eliminates federal subsidies that support environmentally damaging activities within a certain coastal zone. While reviews of this legislation's success are mixed there has generally been some positive effect on overall rates of development. The relevant premise in the American legislation is that federal support for activities (within a specific region) that contravene good conservation policy must be reduced or eliminated. In many jurisdictions implementing such policies would require an integrated response.

Case studies submitted by: Academic source

References: Beatley T. D.J. Brower, and A.K. Schwab 1994, *Coastal Zone Management*, Island Press, Washington D.C.

General Accounting Office, 1992, *Coastal barriers: development occurring despite prohibition against federal assistance*, by Report GAO/RCED-92-115, Washington D.C.

Case Study B18: Debt for nature exchanges

At this time debt for nature exchanges have only been applied in the developing world. This approach has contributed to the preservation of significant areas for biodiversity conservation. Debt for nature exchanges have received considerable attention in the resource management literature. The process is complex and time consuming, and has relied largely on non government organizations, though this is now changing. There may be opportunities for the application of the concept to North America and Europe. In addition to the text submitted to the survey's web site, information has been adapted from "The debt for nature exchange" a publication provided by Conservation International.

Debt for nature exchange is an innovative tool that allows conservation organizations to help underwrite their conservation investments while simultaneously providing a way for a host country to reduce its external debt. In this form of exchange a conservation organization, or another country, acquires a portion of the commercial debt of a developing country, either by purchasing it at a discount (from the debt's face value) or receiving it as a donation. The organizations then forgives the debt in return for the borrowing country's commitment to local conservation. This commitment often takes the form of land preservation.

Debt for nature exchanges are complex transactions that can be subject to prolonged and difficult negotiation. But the opportunities for such exchanges seem to be widening. Since the first debt for nature exchange in 1987 (Bolivia) there have been about 43 recorded world wide, over US\$100 million in debt has been extinguished by private exchanges, and about \$904 million has been retired in public exchanges. Admittedly this is a relatively small portion of aggregate developing world debt. To date all exchanges have occurred the developing world. One advantage that conservation organizations have realized is that debt can be purchased at below the face value. Debt for nature exchanges, as with any contract, are flexible agreements. The timing and the amount of the exchange, as well as the form and timing of disbursements of the exchange's proceeds are often open to negotiation. It is the sum

of many factors that determines the utility of this form of exchange to conservation organizations. Multilateral organizations are now entering the field, and this will change the structure of future arrangements. Aid and loan support may be increasingly linked to exchanges.

While the approach has been exclusively applied to the developing world there are opportunities for extension of the concept to other regimes. In North America most jurisdictions maintain some debt. In Canada the level of provincial debt has grown significantly over that past three decades. Though all provincial governments have recently taken measures to reduce their deficits, and eventually their debt, there may be an opportunity for conservation organizations, or the federal government, to trade provincial commercial debt for specific conservation measures. Adding land to parks, or implementing specific wildlife programs might be financed through debt for nature exchange. In some provinces (for example Ontario) some municipalities have been looking at the potential for privatising municipal services such as water treatment. The existing infrastructure often has an associated debt owed to the province. The province maintains that even if services are sold to the private sector the debt must be paid, but an exchange of debt for conservation on the local level could be considered. The concept of debt for nature exchange has potential application to jurisdictions beyond the developing world. Some examples of debt for nature exchanges are provided here.

In October of 1987, a private conservation group in Ecuador, Fundacion Natura, obtained agreement from the government to exchange up to US\$10 million of commercial bank debt for local currency bonds. The income generated by the bonds finance a broad range of conservation activities in Ecuador including the protection and management of natural areas and their buffer zones, and the training of conservationists. The principal was used to establish an endowment fund for the foundation. The World Wildlife Fund (WWF) acquired \$1 million of commercial bank debt in early 1988 and exchanged it for local currency bonds that mature in 1996. In April, 1989, WWF and The Nature Conservancy acquired the remaining \$9 million of commercial bank debt. This debt also is being converted by the Central Bank of Ecuador into local currency bonds that will mature in nine years.

Cost Rica also agreed in late 1987, to convert \$5.4 million of its commercial bank debt into local currency bonds to create a Natural Resources Conservation Fund. By early 1988, the initial ceiling of \$5.4 million was fully subscribed to by a number of international conservation organizations including CI, The Nature Conservancy, WWF, Asociacion Ecologica La Pacifica, Pew Charitable Trust, the John D. and Catherine T. MacArthur Foundation, the Jessie Smith Noyes Foundation, the Swedish Society for the Conservation of Nature, the W. Alton Jones Foundation, and

the Organization for Tropical Studies. Further exchanges, valued at about \$60.6 million have been implemented in Costa Rica.

Like Ecuador's debt-for-nature exchange, the interest and, eventually, the principal of these Costa Rican bonds will be used to finance a number of conservation activities, including the expansion and management of many of Costa Rica's parks. However, unlike the Ecuador debt exchange, the organizations participating in the Costa Rica transaction donated cash and allowed the administering Costa Rican body to purchase the commercial bank debt on their behalf in the secondary market. The debt was then exchanged for local currency bonds. Unlike the Ecuador transaction, participants in the Costa Rica debt exchange received local currency bonds equalling 75 percent of the principal amount of the debt being exchanged. The administrator of the Natural Resources Conservation Fund is also paid an annual fee equalling 2 percent of the principal amount of the bonds (transaction or maintenance costs must also be considered).

Africa's first debt exchange took place in Madagascar in August of 1989. The country's Central Bank and WWF agreed to exchange up to \$3 million of Malagasy debt at 100 percent of its principal amount over the a two year period. Funding from USAID, about \$1 million, helped WWF purchase the debt and complete the exchange. Proceeds from the exchange are used to protect and manage high priority areas, and to train, equip, and support approximately 400 park rangers. Additional debt in excess of \$900,000 (face value) was converted in August 1990.

In 1992 Poland reached an agreement with the Paris Club, a group of 17 creditor nations, allowing \$3 billion of Poland's debt to be exchanged for environmental concessions. At this time about \$460 million has been exchanged. This is the largest exchange undertaken in any one country. Combining public and private transactions exchanges have involved 19 debtor countries and about \$1.46 billion in debt. However, the total outstanding debt of developing nations stands at over \$1.4 trillion.

Debt relief through debt for nature exchanges is small relative to what is owed. But the impact of exchange funds and trusts can be quite large compared to what many developing nations spend on conservation efforts. The WWF's first exchange in Ecuador reduced an \$8.4 billion debt by only \$1 million, but the resulting conservation fund was twice the existing government budget for parks and nature reserves. In Costa Rica interest from exchanges is several times that nation's park budget.

Analysis of the determinants of the use of exchanges reveals that tropical countries with large numbers of endangered species, nations with high debt service burdens,

and democratic governments are most likely to utilize debt for nature exchanges (see Banks [1990] and WRI [1993] for more information).

Theoretically, the contracts that govern exchanges tend to be structured to minimize overall cost of risk bearing by allocating risks to the parties who can bear it most efficiently. Contracts also attempt to maximize value by mitigating monitoring, enforcement, and conflict resolution costs. Contracts do not specify the responsibilities of parties in explicit detail because at the margin the cost of doing so would outweigh any benefits. Contracts tend to delineate inputs rather than outputs, this reflects the high cost of unambiguously measuring the outputs of environmental services. The constraining factor in completing ownership rights is the degree of enforcement, not legal assignment of title.

Case study submitted by: Environment Canada, additional information provided by Conservation International.

References: Deacon, R.T and P. Murphy, 1997, The structure of an environmental transaction, *Land Economics*, 73(1)1-24.

A.S. Banks, 1990, *Cross national time series data archive*, Centre for Social Studies, SUNY, Binghamton.

WRI in association with UNEP and UNDP, 1993, *A report by the World Resources Institute*, Oxford Press, New York.

For further information contact: Conservation International, 200 - 2501 M Street NW, Washington DC U.S.A., 20037, Telephone 202-887-5188. Or, contact the organizations mentioned in the examples above.

Case Study B19: Corporate and foundation initiatives; CIBC support for Toronto's Waterfront Regeneration Trust

Corporate sources have the potential for providing significant support for environmental work. Support can take the form of funding and expertise. The example from Toronto's Waterfront Regeneration Trust illustrates the types of activities and funding that can be realized from the private sector. Of special interest is the focus of this initiative; public participation and accessibility, and building the capacity of the trust to implement its objectives. The CIBC case may provide an example for emulation in many other jurisdictions.

Support for conservation efforts from the private sector has increased in recent decades. Some foundations, such as the Ford and MacArthur foundations, provide significant direct and indirect support for environmental research and land conservation. Corporations have also moved to support conservation causes. In Canada the Canadian Imperial Bank of Commerce (CIBC) gives about CDN\$15 million annually to a range of groups that cover social and environmental activities. CIBC recently announced a \$1 million partnership with the Waterfront Regeneration Trust. The trust was formed after the Commission on the Future of the Toronto Waterfront recommended a variety of planning activities be undertaken to improve the environmental state of the waterfront. The waterfront area is quite large and encompasses an range of complex residential, industrial and natural areas in one of North America's largest urban regions. The activities of the commission and the primary substance of its recommendations centred on the application of an ecosystem based approach to resource management. The commission and the subsequent trust have emphasized the importance capacity issues, in particular improving public accessibility and participation.

The Bank's donation will be used by the trust to support its efforts to make the waterfront more accessible. As the role of government changes, and resources decline, the CIBC example demonstrates how corporations and the public sector can work together. The bank, through its community development support, wants to help create partnerships with a variety of community organisations, and especially to support groups like the Waterfront Trust, which already serves as a focal point for waterfront regeneration and community development.

The Waterfront Trust and CIBC are pooling their resources and skills to develop, among other initiatives, a public participation and access program that will focus on summer events. This is the first major partnership event with the Waterfront Trust. The participation program will also target tourism by encouraging visitors to use Ontario's special waterfront communities, and will help focus public attention on waterfront rehabilitation efforts.

CIBC and the trust have also committed to a process that will support other community development projects. While no corporate-public sector alliance can satisfy every community need, both partners want to share expertise, offer new perspectives and jointly evaluate and implement community projects that will provide lasting legacies. The CIBC contribution, \$1 million, is a substantial donation by any comparison, and provides a good illustration of the potential impact of corporate assistance. While CIBC assists in the implementation of environmental management, the company's image it also benefits from its support for a highly visible initiative. The waterfront regeneration process involves a range of capacity

building, community planning, and physical environmental objectives that will be advanced by this support.

Case study submitted by: Environment Canada

for more information contact: Waterfront Regeneration Trust, 207 Queen's Quay West, Suite 580, Toronto, Canada, M5J 1A7, Telephone 416-314-8572, Email info@wrtrust.com

C. Air quality, resource conservation

Case Study C1: Reducing CO₂ emissions through energy efficiency: Toronto's local government approach

Energy efficiency within an urban context is being encouraged by local government through a combination of loan incentives, and public/private partnerships.

In January 1990, the City of Toronto made an official commitment to a 20% reduction from 1988 levels of carbon dioxide (CO₂) emissions within the City of Toronto by the year 2005. In July, 1990, Toronto City Council approved the establishment of the Energy Efficiency Office with a mandate to develop a comprehensive energy efficiency and conservation strategy for the City of Toronto. One of the programs developed by the City to help meet its official CO₂ emissions reduction target is the Better Buildings Partnership.

A request for proposals was prepared and issued in September, 1995 inviting submissions from pre-qualified energy management firms (EMF) for the marketing, financing, auditing, engineering, designing, and implementing of the program. Proposals were received in November, 1995 and December, 1995, Toronto City Council adopted a report which recommended that three firms be selected to implement the program (the Besto Group, Rose Technology Group Ltd., and Tesco Energy Services Inc.).

These three EMFs will provide comprehensive turnkey services that lead to the implementation of energy and water-efficiency improvements and other building renewal measures in a representative cross-section of industrial, commercial, institutional and multi-residential buildings. The Better Buildings Partnership initially involves the comprehensive energy and water retrofit of approximately 100 industrial, commercial, institutional and multi-residential buildings in the City in both the public and private sector. The program will have an initial economic impact of \$30 million and a full-scale spending estimate of \$3 billion.

The program is expected to reduce carbon dioxide emissions by 40,000 tonnes per year, create approximately 430 person years of employment, and reduce building operating costs by more than \$3 million annually during the first two years. These activities are consistent with the City's building renewal goals to contribute toward a healthy and robust city.

The retrofits will consist of a mix of short and long-term payback measures in which significant energy and water technologies will be "bundled" together with other building renewal measures to allow for the flexibility demanded by building owners during their decision-making process. Program participants are also encouraged to seize the opportunity to implement additional non-energy, water-related building improvements to their properties in conjunction with energy and water efficiency retrofits.

Financing Public Sector/Non-profit Buildings: The Better Buildings Partnership employs funding from the Canada/Ontario Infrastructure Works (COIW) program as a loan fund for the retrofit of public sector/non-profit buildings. Owners of the buildings are eligible to obtain interest-free loans for two thirds of the retrofit project costs. The remaining one third of the project costs can be financed by the EMF. The utility bill savings realized through energy and water efficiency improvements will be used to repay the loans and provide a means to further expand the program in the years ahead through a revolving loan fund.

Financing Private Sector Buildings: The City of Toronto will assist private sector building owners, where required, to qualify for project financing by providing loan securitisation for up to one half of the project cost. The EMF will provide complete loan financing. This project securitisation will ensure a more attractive interest rate for the program participants and may represent an opportunity for building owners to implement additional building improvements.

Guaranteed Savings: Any shortfall in energy savings, as determined in the contract agreement between the EMF and the building owner, shall be guaranteed by the EMF or through third-party arrangements.

Payback Period: It is estimated that the payback period for the pool of buildings in the program will range from three to ten years with emphasis on projects that are technically comprehensive

Case study submitted by: City of Toronto

For more information contact: Richard Morris, Manager, Energy Efficiency Office, City Works Services, 25th Floor East Tower, City Hall 100 Queen St West, Toronto, Ontario, Canada, M5H 2N2.

Case Study C2: Implementing improvements in energy management; the energy bank approach, Iowa

In order to realize improvements in energy efficiency Iowa has instituted a program of loans to support structural works. The state supports financing which is obtained through private sources.

As in many jurisdictions, Iowa has struggled with rising energy costs, the need to mitigate pollution, the desire for improved economic development, and a lack of funds to pay for these types of project. Recognizing this need, the state's Department of Natural Resources created the Iowa Energy Bank Program to help public and non-profit sector facilities in the state identify and implement cost effective energy management improvements. These improvements not only save energy dollars, but they also reduce emissions from power generation, put money back into the community, and create an opportunity to make needed infrastructure improvements in aging facilities.

The Iowa Energy Bank Program effectively employs a mix of planning and initiative from the public sector and financial support from the private sector to identify and implement cost effective energy management improvements in Iowa's public sector facilities. The Energy Bank provides the necessary technical assistance to implement the energy improvements and removes the barrier of limited funds by arranging financing for all energy projects approved by the Department. The program's steps are made simple for clients. Department staff, marketing contractors and local utilities are all there from beginning to end to ensure that the client receives the assistance specific to their needs.

To date, the Energy Bank has identified and implemented US\$130 million in improvements with a six year payback. The Department of Natural Resources anticipates that a total investment of \$300 million will be necessary to make Iowa's public sector facilities energy efficient.

For each \$1 million financed through the Energy Bank, analysis shows that 25 job years are created; \$167,000 is saved in utility bills; and production of 3,300 tons CO₂, 6 tons NO₂, 7 tons particulate and 60 tons SO₂ is eliminated.

Since the mid 1970's, the Iowa Department of Natural Resource has worked with the Department of Energy through its various funding sources to offer energy management programming. Most relevant to this program has been the Institutional Conservation Program, which allowed states to offer 50% grants to pay the cost of energy studies and improvements with a 2 - 10 year payback. Iowa's ICP allocation averaged \$500,000 annually which could result in a maximum of \$1 million annually invested in energy projects. Since the Department of Natural Resources estimated that \$300 million in improvements were available, it was clear that an alternative was necessary. By forming relationships with experts in the field of energy and finance, the Department was able to develop a comprehensive program to identify and implement all cost effective improvements in the state with no budget impact. The program has three steps to work toward implementation. The first is marketing the concept and services to clients, second is evaluating potential projects and, third is financing and implementation of projects.

Upon review and approval of the technical documentation for the energy improvements, the Department of Natural Resources assists the client to receive financing for the total cost of the program (including the cost of analysis and a small program fee). There are two types of financing available through the Energy Bank, both are arranged through local and regional banks or investment firms and are not dependent on public sector funding.

Lease financing is available for all clients of the program, but is primarily used for hospitals and private colleges. This type of financing is a full term municipal lease and is available to any client for projects with an aggregate payback of six years or less and a minimum implementation cost of \$15,000. The interest rate offered changes daily according to the Delphis Hanover A rated general obligation bond index. Clients financing for more than a four-year term are offered a rate of 87 basis points above the A bond rate. Those clients who choose the option of a term lease less than four years pay 92 basis points above the A bond rate. The interest rate is fixed when the district obligates the funds. Lease repayments are structured over a three to twelve year period and are designed so that monthly energy savings are greater than lease payments and the initial payment may be made any time from 9 to 18 month after the agreement takes effect.

The second financing option is the capital loan note, which is most frequently used by schools and local governments. The capital loan note provides clients with a slightly lower interest rate because it is more directly tied to the taxing ability to the entity and eliminates the need for a legal description of the property. The term of the loan note determines the interest rate above the Delphis Hanover bond index, ranging

from 85 basis points for a three year note down to 12 basis points for a twelve year note. Most Energy Bank clients finance improvements over a six year term.

For more information contact: Monica Stone, Executive Officer, Building Energy Management Section, Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319, U.S.A.

Case Study C3: Improving industrial processes; National Cleaner Production Centres

UNIDO is encouraging the development of cleaner industrial production processes by supporting a multilateral extension program. The initiative emphasizes demonstration projects and technology transfer. Funding is provided through UNIDO, national governments, public/private partnerships, and support from a private foundation. The approach is integrative in structure, pro-active in emphasis, and has received multi-lateral funding.

Cleaner industrial production (CIP) is an integrated preventative strategy applied to processes, products and services to increase efficiency and reduce risk to humans and the environment. For industrial processes, CIP includes the efficient use of raw materials and the reduction of emissions at source. For products and services, the strategy focuses on reducing negative environmental impacts along the entire life cycle, from design and use to ultimate disposal. Experience with CIP shows that many improvements can be made in the industrial process at little or no cost, thereby increasing the profitability of a process. Cleaner Production Centres are being developed in Brazil, China, Czech Republic, Hungary, India, Mexico, Slovak Republic, Tanzania, Tunisia, and Zimbabwe.

The emphasis that this definition puts on the process indicates the importance that UNIDO attaches to the life cycle approach as an integral part of reaching sustainability (at least to the extent that issues are affected by the productive sectors of the economy). But the approach is in many respects formative and does not yet produce many practical solutions that can be easily applied to firms in either developing or developed countries.

In order to transfer, or provide, a method of reducing resource use and pollution discharge in the most cost effective way, with short pay back periods, the program focuses on the potential for direct savings in the production process. Indirect savings are also addressed through reducing disposal costs. The objective of the program is to establish National Cleaner Production Centres (NCPC) that facilitate the transfer

of CIP information and technology from developed and developing countries to industry and environmental management agencies in developing countries and economies in transition. This will ultimately enable recipients to incorporate CIP techniques into their efforts to reduce industrial pollution. To reach the program's objectives NCPCs undertake four sets of activities; in plant demonstrations, training, information dissemination, and policy assessment and advice. Each of the activities is interrelated and integrated, and each strongly support the other. Distinction between the activities cannot always be sharp and there is some expected overlap.

The principal goal of the program is to facilitate the application of the concept of CIP into the industrial sector and incorporation of the concept into environmental legislation in developing countries.

This program is a joint initiative of the United Nations Industrial Development organization (UNIDO) and the United Nations Environment Program (UNEP). UNIDO is the executing agency while UNEP is the cooperating agency. Staffing is relatively small and the program falls under UNIDO's Environment and Energy Branch. The program is funded jointly by the governments of the Netherlands (which supports centres in China, India, Zimbabwe, Tanzania, and Mexico) Austria (which supports centres in the Czech and Slovak republics). The Brazil centre is supported by a self financed trust fund. UNEP provided significant support in the first year. Each NCPC director has an annual discretionary budget of about US\$40,000 (provided from UNIDO administrated funds), on request other assistance is arranged through the program office; assistance such as counterpart institution support or other international experts. The average annual budget per NCPC provided by UNIDO is about US\$200,000. Each centre is funded for an initial period of 3 years with a possibility for a 2 year extension.

Case study submitted by: United Nations Industrial Development Organization, Environment and Energy Branch.

For more information contact: Miguel Rigola, Director, Environment and Energy Branch, Industrial Sectors and Environment Division, UNIDO, Vienna International Centre, P.O. Box, 300, A-1400, Vienna, Austria, Telephone 21131-3942, *or*

Igor Volodin, Program Manager, NCPC, Environment and Energy Branch, Industrial Sectors and Environment Division, UNIDO, Vienna International Centre, P.O. Box, 300, A-1400, Vienna, Austria, Telephone 21131-3942.

Appendix A

Critique of the survey method

A content review of reports or journal articles, mail surveys, or a combination of these methods would have been the most common approach to collecting case study information. These techniques are effective, but they may be costly and cannot be effectively completed in a short period of time. One alternative was to develop an electronic survey form that would be accessed through a *web site*. Using the Internet provided the opportunity to develop a pilot study on examples of innovative funding for environmental work at a reasonable cost and with minimal administrative problems.

The number of people who have access to the Internet has grown significantly in recent years and it reaches an extensive global audience. The Internet survey format also allows for instant processing of results. A voluntary survey model with open-ended questions provided respondents with the opportunity to describe any experience they might have with creative funding. The common rules of sampling design, or census taking, could not be readily applied to this form of survey, and a response rate cannot be measured against a known population or sample size.

Initially it was thought that the success of the Internet as a survey tool would depend largely on two factors; making a large number of potential respondents aware of the survey, and structuring the open ended questions and the format in a way that elicited the desired information but provided flexibility for respondents. The response rate is always an issue in traditional voluntary mail surveys. The challenges presented by using the Internet to collect voluntary case studies increases the unreliability inherent in predicting a response rate. It was estimated that the response rate would be between 25 and 250 responses for the six months that the site was posted (an admittedly generous range). This was based on the consultant's experience with traditional surveys applied to industry, government, academic, and NGO groups, and the response rate Environment Canada received to a similar *call for information* posted at their GLIMR *web site*. Posting the survey for a longer period of time might have increased the response rate, but the project undertaken here is intended to be a pilot study. It was also thought that the target groups were likely to be motivated and constitute a sample of elites who would be more likely to contribute.

The survey was based on voluntary participation. Unlike a mail survey this approach relies on the willingness of potential respondents to seek out the questionnaire. The success of the Internet survey depends to a great extent on how respondents find out about it. The target group included government, conservation and environment organizations, business, academics, and individuals who have had experience with creative conservation financing. Predicting a response rate is difficult in a traditional voluntary mail survey. The special challenges presented by using the Internet to collect data adds to the unreliability inherent in predicting the response rate of any voluntary survey).

Responses were also received by mail. In some instances respondents had information in a form that was not conducive to using the Internet site (reports, grant inventories, and other documents).

Two methods were used to advertise the survey:

- **The Internet**, through appropriate *web sites* and email circulation lists. About 120 email notices were sent, and the University of Toronto posted a note about the survey and provided a link from its *Institute for Environmental Studies Homepage*. In some instances the receiving organization circulated the email note, for example the U.S. Bureau of Land Management copied the notice to its division and state offices. Conservation and environmental *web site* managers were also notified. The American Waste Water Association noted the survey on its *Waterwiser* site, the University of Toronto's Institute for Environmental Studies provided a reference and a link, as did some smaller sites such as the *Environmental Professionals Homepage*.
- **Information Notes** were mailed to a range of conservation/environmental organizations. Approximately 600 Information Notes were mailed to the conservation and environmental management agencies in every state and province, relevant federal offices in Canada and the United States, and to a selection of international organizations involved in conservation. A range of non-government organizations in North American and overseas were also included. Some responses indicated that the Information Note was being included in the circulation files of agency offices. Newsletters were also helpful, for example the Soil and Water Conservation Society noted the project in their *Conservogram* newsletter.

Every water, soil, fish, forestry and wildlife conservation agency of commission, environmental agencies, and specialized departments (such as shoreline management, and forestry commissions) in all Canadian and U.S. federal, provincial, and state

governments received the Information Note. Current government and non government directories for both nations published by government and private publishers were used to obtain addresses and agency titles. When email addresses were available an email note was also sent. The notes were addressed to senior personnel with a request for distribution within the organization. In most instances the notes were sent to more than one person in an organization (depending on the size of the agency). Environment departments or conservation divisions within the OECD, World Bank, UNEP, UN agency secretariats, UNESCO, UNEP, UNDP, UN regional offices, development banks, and other related programs also received the note. Non government environment and conservation groups listed in current government and private directories from Canada and the U.S. were also contacted. The project consultant is confident that virtually all relevant agencies in North America and multilateral organizations were contacted. But there is no guarantee that information about the survey was distributed widely within agencies. The degree of exposure to NGOs was probably not as extensive.

The Information note (release) was mailed as soon as the survey was posted. This reduced the potential for the delivery of a notice before the survey was online. Two mailings were used, one in November and a second in February. Using a mail notice helped encourage input from individuals who did not have easy access to the Internet. In some office intra-nets may not be in use, and a mail circulation file would be the more common way of distributing information. And for a variety of reasons some information managers may not have been willing to copy an email note to their networks. Using both email and regular mail simply increased the opportunity for receiving feedback.

Pending approval, the results will be reported through Environment Canada's GLIMR *web site*. The case studies may also be made available by Environment Canada in printed form for those who do not have ready access to the Internet. The results may also be made available to the project consultant unless directed otherwise by the agency.

The response rate was very small, only 45 responses received through the Internet site, and another 5 by post. Many respondents provided only a brief description. Some respondents provided reports or grant inventories which were reviewed to determine which case studies constituted examples of innovative funding. In other instances the consultant was told by email or through the Internet site about individuals and organizations that were involved in encouraging or developing creative funding. In these cases the consultant followed up by contacting the organization or individual to find out if relevant information could be obtained. Such contacts provided excellent information and suggest that approaching agencies

directly for case study data would be the most effective method of information collection.

The majority of the case studies received relate to water resources. Despite considerable effort to solicit information from Canada there were few Canadian responses. Most responses were American.

How can the response rate for an Internet based survey be enhanced?

If the Internet is the preferred venue for collecting case study information or conducting other surveys then several elements should be considered. The success of an Internet site as a survey tool for venue for collecting data will rely largely on five factors:

1. Posting time, the longer the survey site is posted the more opportunity there is for accidental respondents to find it and provide information. The relatively short posting time for this Internet questionnaire certainly limited the number of responses.
2. Where the site is posted. This survey site was posted through a private Internet service provider because it would have taken much longer to have the questionnaire developed and posted through one of the available government sites, but the cost was undoubtedly lower visibility. Consider obtaining a WWW designation that provides some form of individual and distinctive identification, or make sure that the survey is accessible through a frequently visited *web site*.
3. Advertising the site through information notes and other announcements, Internet bulletin boards, even paid announcements in appropriate journals and magazines are not only helpful but are essential if the posting time is brief. Ultimately there is little control over who actually responds, paid advertising in relevant journals or magazines may increase the number of responses but cannot insure that they will be of the desired quality.
4. The choice of language may be important, but this is variable. Though most of the agencies contacted function in English to an extent, the use of Spanish and French can also be important. The survey was posted in French in order to make it accessible to all Canadians, and to encourage responses from overseas. But no responses in French were received. Spanish is a widely

spoken language in the developing world and may also be useful in this context.

5. Do not assume that there is widespread access to the Internet. Many agencies have email, but do not provide Internet access. It is important to provide an alternative way to contact a survey administrator. Responses received by mail account for a significant number of the case studies developed here.

Using the Internet as a survey tool will not provide the degree of quality control, potential distribution, or response rate that other more orthodox survey methods usually obtain. In the context of this survey the primary utility of the Internet will be as a method for making a database available to the public.

Appendix B

Survey questions and format

Innovative Initiatives for Financing Environmental Cleanup and Conservation; A Survey Sponsored by Environment Canada

Si vous preferez le francais ☐

Welcome to the innovative financing survey. The purpose of this questionnaire is to create a database of new and creative ways of financing environmental conservation work. We want to hear from people who have had actual experiences with cleanup and conservation initiatives that have been creatively financed. If you are involved with, or are aware of, such a program or project please take a few minutes to participate in the survey.

The reality that many conservation agencies around the world now face is that traditional sources of government funding are no longer reliable, but cleanup and protection work still has to be done. New and alternative sources of funding have to be explored. Environment Canada wants to hear about imaginative ways that such efforts have been funded. We want to learn about actual case studies where cleanup and protection have been done in partnership with conservation and environment groups, business or individuals. We want to hear about the use of innovative tools such as trading programs, user fees, licensing programs, special charges, voluntary mechanisms, private sector work, or any other example you know of. The examples can be from the air, land, or water sectors.

Examples might include financing:

- Sewage and storm water treatment, drinking water supply, or sediment remediation
- Reforestation
- Restoring or creating habitat for fish, wildlife, waterfowl and other birds.
- Agricultural non-point source pollution of water, or soil erosion control.

- Environmental recreation, staffing interpretive centers, supporting National Parks.
- Municipal waste collection and disposal.
- Small scale projects in soil and water conservation
- Or other examples from air, water or land use conservation, protection or cleanup.

There may be many creative tools being used to finance investments in the environment (either in whole or in part). In many instances only a few people may know about these examples, although many could benefit from learning about them.

There is no intent by Environment Canada or its consultants to formally endorse any of the experiences submitted. Any database that results from this survey will provide a means of sharing successes, and may encourage the exploration of more creative ways to finance a cleaner environment.

There are five questions and the survey should take no more than a few minutes, depending on how much information you want to provide. **If a sufficient number of examples are submitted**, the resulting database will be available through Environment Canada's Ontario Region home page after May 1997. If you would like more information about this project, contact names are provided at the end of the survey. This survey is sponsored by the Government of Canada, Environment Canada.

If there are other people you know of who would be interested in contributing to the survey please tell them about our Internet address. If you have printed information about a specific case study please take a moment to mail a copy to the address indicated at the end of the survey. **Thank you for your help.**

Question 1. (All boxes will expand to accommodate whatever you type)

What is the location of the case study? (State, province, or if outside North America provide the country name).

Question 2.

What issues or problems are addressed by the case study? For example; air quality, habitat remediation, water quality, deforestation, sediment remediation, wilderness preservation...

Question 3.

Please provide the name and a brief description of the conservation or cleanup project. In your description indicate what the case study does. For example, does the project improve sewage or storm water treatment, restore fish habitat, pay for reforestation...?

Question 4.

Please describe the financing details. For example, how has the case study been financed? Who provides financial support? How much funding has been generated? And how did this creative form of funding come about?

Question 5.

What is the address for the project or program, is there someone who can be contacted for more information about the project or program you have described?

May Environment Canada make the contact person's name available in a database?

Yes ☐ No ☐

To submit your survey form click here. Thank you for your time and help.

If you would like further information on this project please contact Kevin Hanna at khanna@ibm.net, or Karl Schaefer at karl.schaefer@cciw.ca.

(A post address was provided here)

If a sufficient response rate is obtained a summary of the survey results will be posted in a database available through the Environment Canada, Ontario Region home page (GLIMR), after April 1997

Go to the GLIMR home page

